
INDIA

TRANSACTIONS

OF

THE ASIATIC SOCIETY

OF JAPAN.

(From 30th October, 1872, to 9th October, 1873.)

VOL. I.

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1882.

CONTENTS.

ASIATIC SOCIETY OF JAPAN.

The first Annual Meeting of the Asiatic Society of Japan was held in room No. 19, at the Grand Hotel, Yokohama, on Wednesday, the 8th October, 1873, at 8.30 p.m.

On taking the Chair, the President, R. G. Watson, Esq., explained the reasons which had led to the deferment of the annual meeting till the present time, which was, however, in fact, the true anniversary of the Society's commencement of actual work. He called on the Secretary to read the minutes of last meeting, which were approved; and also the Report of the Council of the Society, which was as follows:—

REPORT.

In presenting their First Annual Report, the Council of the Asiatic Society of Japan are checked in the congratulations which they had hoped to present to their constituents, by the necessity for announcing the heavy loss sustained by the destruction, in a recent fire, of the printed matter intended for the first number of the Society's journal.

The loss, however, is not irretrievable, since it will be possible to reproduce most of the articles intended for publication, though not without a delay of some few weeks. This will somewhat retard our entering into relations with other Societies of similar character, and obtaining their publications in return for our own; but no great harm to the Society need be felt from this slight check to our progress: certainly none will be felt if we are stirred up to greater determination that the objects we have in view shall be the more vigorously prosecuted.

As evidence that interest has not been lacking, the Council refer to the following List of Papers read before the Society at its regular Meetings during the past twelve months.

1.—On the Loochoo Islands, by Mr. Satow.
2.—On the Hyalonema Mirabilis, by Dr. Hadlow.
3.—On the Streets and Street-Names of Yedo, by Mr. Griffis.
4.—On the Ascent of Fujiyama, by Mr. Hodges.
5.—Five Short Papers on the Language of Loochoo, by Japanese Students.

6.—Notes of a visit to the Mulgrave, Islands, by Officers of H. M. S. *Barossa*.

7.—On the Geography of Japan, by Mr. Satow.

8.—On Cyclones in Japan, by Lt.-Com. Nelson. U.S.N.

9.—On Russian Descents in Saghalien, by Mr. Aston.

The prospect of receiving valuable papers during the coming twelve months is good; and with the confidence that their successors will find little difficulty in carrying on the operations of the Society, the present Council beg to resign their offices.

Fifty-nine members have been added to the Society since the first Meeting at which it was organized; the whole number at the present time being—Resident Members 64, Honorary 2, Corresponding 3. One has died and 5 are absent.

The newly-established German Asiatic Society of Yedo has courteously presented us with a copy of their Proceedings; and the Royal Asiatic and Geographical Societies of London have—through the good offices of Dr. Hadlow—promised to exchange their publications for ours.

A commencement has been made by ourselves towards the establishment of a Library and Museum, by the presentation of some few books and specimens; but this part of our operations requires a building of our own before it can be expected to flourish.

The balance now in the Treasurer's hands to the credit of the Society is $303.75.

On behalf of the Council.

EDWD. W. SYLE,
Hon. Sec.

It was moved by Sir Harry Parkes and seconded by Mr. Bellamy—

That the Report of the Council be accepted, and the thanks of the Society be tendered to them for their services during the past twelve months.

On the motion of Mr. W. H. Smith, seconded by Mr. Aston, it was resolved—

That the following gentlemen be the office-bearers of the Society for the coming year:—

President—J. C. Hepburn, Esq., M.D.

Vice-Presidents—Rev. S. R. Brown, D.D.,
Sir Harry S. Parkes, K. C. B.

Council—E. Satow Esq.
A. J. Wilkin, Esq.
W. G. Howell Esq.
Bayly Done, Esq., M.D.*
R. H. Brunton, Esq.

Treasurer—R. B. Baker, Esq.

Recording Secretary—A. Bellamy, Esq.

Corresponding Secretary—Rev. Ed. W. Syle.

Curator and Librarian—H. Pryer, Esq.

* Since deceased.

MEMBERS.

Honorary.

Admiral Sir C. Shadwell, K. C. B.
Captain Arthur, R. N.

Corresponding.

Dr. J. Berry, Kôbe.
Rev. J. Edkins, Peking.
J. J. Enslie, H. B. M. Consul, Kôbe.

Resident.

Allen, H. Jnr.
Aston, W. G.
Atkinson, H.
Ayrton, W. E.
Baker, R. B.
Baker, Colgate.
Bate, Clifford.
Bellamy, A.
Bingham, Hon. John A.
Bissett, Jas.
Black, J. R.
Boyle, R. Vicars, C. S. I.
Brent, A.
Bridgford, Captain, R. M. A.
Brinkley, F., Lieut. R. A.
Brooke, J. H.
Brown, Rev. S. R.
Brown, Rev. Nathan.
Brown, R. M.
Brunton, R. H.
Caldwell, Dr. J., R. M.
Cargill, W. W.
Chipman, H. S.
Cochran, Rev. G.
Christie, F. C.
Davison, Jas.
De Groote, Hon. C.
De Long, Hon. C. E.
Dickins, F. V.
D'Iffanger, F.
Dodds, J.
Done,* Dr. Baily.
Dracachis, N. Z.
Dyer, H.
Elliott, Dr. W. St. Geo.
Fagan, Lt. C. S. F., R. M.
Fisher, S.
Flanders, C. A.
Fraser, John A.
Griffis, W. E.
Grigor, J.
Gubbins, J. H.

*Deceased.

Hadlow, Dr. H., R. N.
Hamilton, Geo.
Hardy, J. T.
Hartley, J.
Hawes, Lt. A. G. S.
Hegt, M. J. B. N.
Henderson, J. Y.
Hepburn, J. C., M. D.
Hill, Captain A., R. M.
House, E. H.
Howell, W. G.
Irwin, R. W.
Jackson, T.
James, F. S.
Kilby, E. F.
Lawrence, C. W.
Lothrop, S. K.
Maclay, Rev. Dr.
Marshall,* W.
McArthur, H.
McDonald, W.
McDonald, Rev. D.
McRitchie, J.
Mori, A.
Muñoz, Rodriguez y
Murray, Prof. D.
Ojeda, Señor
Olarovsky, A.
Owston, A.
Parkes, Sir H. S., K. C. B.
Pitman, J.
Pole, G. H.
Pryer, H.
Purcell, Dr. T. A.
Purvis, Captain, R. N.
Robertson, R.
Robertson, J.
Sandemann, F.
Sandwith, Lt. J. H.
Satow, E. M.
Schoyer, E. A.
Shand, W. J. S.
Shaw, Rev. A. C.
Shaw, T. K.
Sitwell, Isla. S.
Smith, W. H.
Stransome, S. J.
Summers, Rev. Jas.
Sutton, F. W.
Syle, Rev. E. W.
Van Reed,* E. M.
Veeder, Rev. P. V.
Von Brandt, M.
Von Siebold, Baron A.
Walsh, J. G.
Walsh, T.
Wasson, J. A.
Watson, E. B.
Watson, R. G.
Wauchope, G.
Webb, W.
Wheeler, Dr.
Whittall, E.
Wilkin, A. J.
Wilkinson, H. S.
Wooley, W. A.
Wright, Rev. W. B.

*Deceased.

ASIATIC SOCIETY OF JAPAN.

RECEIPTS AND EXPENDITURE, 1st JANUARY TO 31st DECEMBER, 1878.

Dr.

RECEIVED.

Subscriptions	$449.50
	$449.50

Cr.

PAID.

Preliminary Expenses	$26.00
Printing, Stationery and Advertising, etc.	47.40
Binding Books	7.50
Rent	35.00
Furniture bought	38.00
	$153.90
Balance in hand, 31st December, 1878	$295.60
	$449.50

E. & O. E.

R. B. BAKER,
Honorary Treasurer.

NOTES ON LOOCHOO.[1]

By E. Satow, Esq.

[*Read before the Asiatic Society of Japan, on the 30th October, 1872.*]

Loochoo, called Liukiu by the Chinese and Riukiu by the Japanese, is the chief island of a group lying in the North Pacific Ocean, between the 24th and 29th parallels of latitude. Its name is said to be derived from a fancied resemblance to a 'dragon lying stretched out,' but is not written with the Chinese characters which would bear that interpretation. In the commencement of the 14th century it was split up into three independent sovereignties called Chiuzan, Sannan and Samboku, which were re-united under one monarch about the year 1480. Since that time it has been divided into three provinces, namely, Shimajiri Sei on the south, Chiuzan Sei in the centre, and Kunikia Sei on the north. The central province contains the capital Shiuri and its port Nafa. The whole number of subject islands, including those on the north, which in later times were considered as belonging to the Princes of Satsuma, is thirty-six. The smaller ones are administered by a single Governor, while to Taiheizan (or Miyako) Yayéyama and Ôshima[2] three, and to Bashi, two officials are appointed.

The Japanese manuscript account called Riukiu Jiriaku (by Arai Hakuséki), states that the first intercourse between Japan and Loochoo took place in the year 1451, [2] under the Emperor Hanazono II, when certain Loochooans brought a present of a thousand strings of cash to Ashikaga Yoshimasa, the ruling Shôgun. In those days very little

[1] Revised by the Author.

[2] Ôshima, Kikai-ga shima, Toku-no shima and Oki no Erabu shima were entirely under the jurisdiction of Satsuma. The author of the Chiuzankoku Shiriaku seems to have been ignorant of this fact.—E. S.

copper money was coined in Japan, and the greater part of the currency consisted of Yunglŏ (Yeiraku in Japanese) cash purchased from China by shipments of gold dust, so that the offering was no doubt highly acceptable. From this time onwards the Loochooans frequently traded to Hiôgo, and we find mention made of another embassy in the year 1580, during the supremacy of Hidéyoshi, or, as Europeans usually style him, Taikô sama. The relations between Loochoo and the province of Satsuma were always of a most friendly character, and vessels came annually to Kagoshima laden with presents. But about the beginning of the 17th century a Loochooan Minister named Jana, who was desirous of getting into favour with the Ming dynasty, at that time still rulers of China, persuaded the King to stop all communication with Japan. The Prince of Satsuma, Shimadzu Iyéhisa, who bore the title of Mutsu no kami, despatched a messenger to demand an explanation, but Jana treated the envoy with such disrespect that Iyéhisa's anger was aroused, and he started for Sumpu (the modern Shidzuoka), where Iyéyasu was then enjoying the sweets of retirement after having subdued all his enemies, to obtain permission to use force in bringing the Loochooan King to his senses. Full power having been granted to him to take whatever measures he might judge necessary, he proceeded on his expedition in the month of March, 1609, with a large fleet of war-junks. The bravery displayed by his troops was such that in a few months' time they took the capital by assault, and making the king prisoner, returned in triumph to Kagoshima, where the unfortunate prince had to undergo a confinement of three years' duration as an expiation for his offence. It appears from the annals that the Chinese did not discover this until after the king's return, so that they were unable to assist their vassal.

From this date the kingdom of Loochoo became subject to the princes of Satsuma, the Shôguns not caring, [3] or perhaps not venturing, to interfere with the conquest made by Iyéhisa. The only marks of homage which were required by the House of Tokugawa from the Kings were a submission to re-investiture upon the accession of a new Shôgun, conveyed through the medium of the Prince of Satsuma, and the despatch of embassies to Yedo to return thanks on the succession of each Loochooan sovereign. We find from

the chronological tables entitled *Shinsen Nempiō* that fifteen embassies, mostly undertaken for that purpose, came to the Shôgun's capital, beginning with the year 1611 and ending with 1850. Considering the proximity of Loochoo to China, it is no cause for surprise that investiture should also have been received from the Court of Peking. Full descriptions of this ceremony are to be found in the Riukiu Kokushi riaku *(Liukiu Kuochi lio)* a Chinese work reprinted in Japan.

Very little appears to be known of the history of Loochoo anterior to the 12th century, and its real annals commence with Shunten, who ascended the throne in 1187. Shunten is said to have been the son of the famous warrior Tamétomo, who after the defeat of his party in the civil war of 1156, was exiled to Vries Island, and fled some years later to Loochoo. Shunten was succeeded by his son and grandson, after whom the throne was occupied by descendants of the ancient sovereigns during five generations. The son of the last being a child only five years old, the people set him aside, and elected the governor of Urasoyé, named Satto, to be their King. From him is descended in a direct line the present sovereign Shôtai, who is the 34th since Shunten.

The climate of Loochoo, as we should expect from its position, is very warm. Ice is never seen, and snow falls but rarely. The vegetation is green throughout the year, and resembles for the most part that of the south of China. Of rice six kinds are produced, of barley and wheat three, and six sorts of beans. The sweet potato is cultivated in large quantities, though not indigenous, and forms one-half of the sustenance of the people. Each [4] household possesses a number of plantain trees, from the fibres of which the women weave the only cloth made in the island. It is worn by both sexes throughout the year. Both the cotton and tea plants are cultivated, but apparently to no great extent. The sugar-cane grows freely. The vegetables are of unlimited variety, including every kind of gourd and melon. Most of the trees known in Japan and several species peculiar to China are successfully reared. The domestic animals are the cow, horse, sheep, pig, cat and dog, and amongst wild animals the deer, ape and wild-boar are mentioned, but no beasts of prey exist in the islands. The natives keep domestic fowls, ducks and geese, and the game consists of wild

pigeons of various sorts, quail, pheasants and mandarin-ducks. The swallow makes its visit in the month of August, and the hawk is blown over from the outlying islands by the north-east wind in October. Wild-geese are sometimes seen, but storks rarely. Of fish they have the shark, ordinary carp, perch, eel, mackerel and golden carp, besides prawns.

The houses of the Loochooans are built in Japanese fashion, with the floor raised three or four feet from the ground, and have mostly only one story, on account of the violent winds which prevail. They are roofed with tiles of a Chinese fashion, very strong and thick. The buildings in which they store their rice are built of wood and thatched with straw. They are supported on wooden posts about five feet high, and resemble the granaries of the Ainos, though constructed with much greater care.

According to Japanese accounts, the natives of these islands are of a calm and reflective temperament, not given to losing their presence of mind even on the most trying occasions. They observe the precepts of Confucius and are extremely courteous in their demeanour towards others. Conservative in their opinions, they also adore the native gods. In fact, such value do they attach to a polished behaviour that they style their native land 'the country which observes propriety,' and pillars inscribed with this appellation in Chinese characters stand at the corners of [5] the streets in Shiuri. It may be as well to observe in passing that the name given to the metropolis of Loochoo means simply 'chief city,' according to the practice which also obtains in China and Japan, where we find Nanking and Peking on the one hand, Kiôto and Tôkei (or Tôkiô) on the other.

The customs of the Loochooans seem to be, in the main, derived from China, as we find is also the case in Japan, and it is not improbable that, while many changes have taken place in the two latter countries, the Loochooans have preserved those customs unaltered. The following details are taken from a Japanese named Tomioka Shiukô, who compiled a short notice of these islands entitled '*Chiuzan-koku Shiriaku*,' or 'Short account of the Loochooan Embassy,' some twenty years ago, on the last occasion[3] when an embassy visited Yedo.

[3] An embassy has since visited Yedo in the year 1872.—E. S.

The Sovereign wears a cap called *ben*, made according to a pattern worn in the time of the Ming dynasty. It is of black gauze, and consists of a spherical piece which sits close to the head, with a low crown rising above it. On each side rises a long piece of gauze (not unlike asses' ears). The head-covering used by the nobles looks rather like a dried-up turban, and originally consisted of a long piece of cloth wound round the top of the head. At present it is formed of sheets of paper pasted together, covered with silk damask in overlapping layers, seven in front and twelve behind, and the rank of the wearer is indicated by the colour. The dress universally worn is a loose gown, descending to the feet, with sleeves reaching to the tips of the fingers. Under this is worn a short garment of silk or fine hempen cloth. Round the loins is wound a girdle fourteen or fifteen feet in length and six or seven inches in width. The stuff of both gown and girdle varies, of course, according to the rank of the wearer, the nobles indulging themselves in rich silks and brocades for these purposes, which are imported from China. These parts of their dress have evidently been [6] borrowed from China, but their socks, straw sandals and wooden clogs are of the forms usual in Japan.

Both men and women tie their hair into a knot on the top of the head, passing a pin through it, sometimes more than a foot in length. The best are made of gold throughout, the next best of silver with a golden top, the commonest of copper. The girdle, worn exclusively by the men, is the only difference in the dress of the two sexes. Between the ages of sixteen and nineteen the ceremony called *gembutsu*, which corresponds somewhat to coming of age, takes place for the males. The central part of the top of the head is shaven, and two short pins are substituted for the long one previously worn, one of which is ornamented with an artificial narcissus-flower, while the other has the form of an ear-pick. This practice of shaving part of the hair dates back only two centuries, and is probably a mark of Tartar influence. At the age of four-and-twenty the men grow their moustaches, and the beards six years later.

The study of Chinese literature is based on the commentaries of Kuŏtzŭ, a learned scholar of modern times. Medicine is studied both in China and at Kagoshima, and no one is allowed to carry the

medicine-case *(inrô)*, which is the distinguishing mark of a physician, if he has had only a native doctor for his instructor. A few Loochooans endeavour to imitate the caligraphy of the old Chinese inscriptions, and read the classics according to the modern Chinese pronunciation, but the majority learn to write the Japanese *hiragana*, and copy the handwriting of the Japanese caligraphists Ohashi and Tamaki. Instead of reading Chinese straight down the page, they construe it backwards and forwards into their own language like the Japanese. In the pictorial art they have copied both the Chinese and the Japanese, but they have also a school of native growth. Their music is that of the last two Chinese dynasties, and is performed on instruments of Chinese form. In the arts of arranging flowers in vases and of making tea, both of which require many years of practice, they follow the Japanese style, and they [7] play such games as *go*, or draughts, according to Japanese rules.

As regards more manly accomplishments, they are expert archers on horseback and good marksmen with the matchlock. Their skill in boxing is such that a well-trained fighter can smash a large earthen water-jar or kill a man with a single blow of his fist.

The men spend their lives away from home, and despise all other than official occupations, while the women remain within doors and keep house. Girls begin to learn their duties, which consist in spinning and weaving cotton, hemp and silk, at the age of four or five, and are married at fourteen or fifteen. In the higher classes valuable presents are made on these occasions, but the common people are not expected to go to greater expense than a bag of rice and two strings of cash. Formerly, when a male child was born, his hair was allowed to grow naturally, but in more modern times it has become the custom to shave the head until the second or third year. The female children are tattooed on the arms, from the fingers up to the elbows, with small black dots. Their underclothing is longer than that worn by boys, while the upper garment, which is shorter, is turned up outside. Though they wear no girdles, the wind cannot disarrange their dress, because they keep the opening of the gown close with the hand as they walk along. Married women are seldom allowed to see any men but their husbands, with the exception, perhaps, of very intimate friends, and even then they may not converse. If a visitor calls when the

husband happens to be from home, no matter how excellent their terms of intercourse may usually be, he is not allowed to come inside the door. These precautions are adopted in order to prevent suspicions of unfaithfulness being excited. In the market places throughout the country only women are to be seen exchanging their wares; the men have no concern in the matter. It follows from this that they have no one to carry home their purchases for them, and they have to do this themselves, supporting the burden on a bundle of straw placed on the [8] top of the head. The wives of the better classes go to market in the same way as the poorer women, from whom they are distinguished by a piece of cloth a foot long carried in the hand.

Formerly, when a Loochooan died, he was provisionally buried for three years, until his corpse decomposed so far as to leave only the bones. These were taken out of the coffin, washed clean in a kind of *saké* called *awamori*, and being placed in a small vase, were deposited in the tomb. The tombs are small holes excavated in hill sides, just large enough to admit the vase, and the entrances are closed with wooden doors or slabs of stone. It seems, however, that at the present time the ordinary Japanese method of burying the corpse at once is followed, the ceremony being conducted by Buddhist priests.

A man's tomb is decorated with a piece of white cloth and a hat, and a pole is stuck in the ground close by on which are hung his straw sandals and wooden clogs. On a woman's grave they place a palm-leaf fan, fresh leaves of the same and a piece of white cloth.

There were formerly three classes of persons who shaved their heads and wore the skull cap called *hempō*, namely, the physicians, the king's servants and his gardeners, but at the present time the Buddhist priests alone practise this custom. There are only two sects of Buddhists, the *Shingon shiu* and *Rinzai shiu*, both of which also exist in Japan. The Chinese Government does not allow Loochooans to study theology within its dominions, and they are therefore compelled to go through the usual course at Kagoshima. Up to the beginning of the 18th century they were in the habit of making pilgrimages through Japan, but by a subsequent law they are prohibited from extending their peregrinations beyond the boundaries of the province of Satsuma.

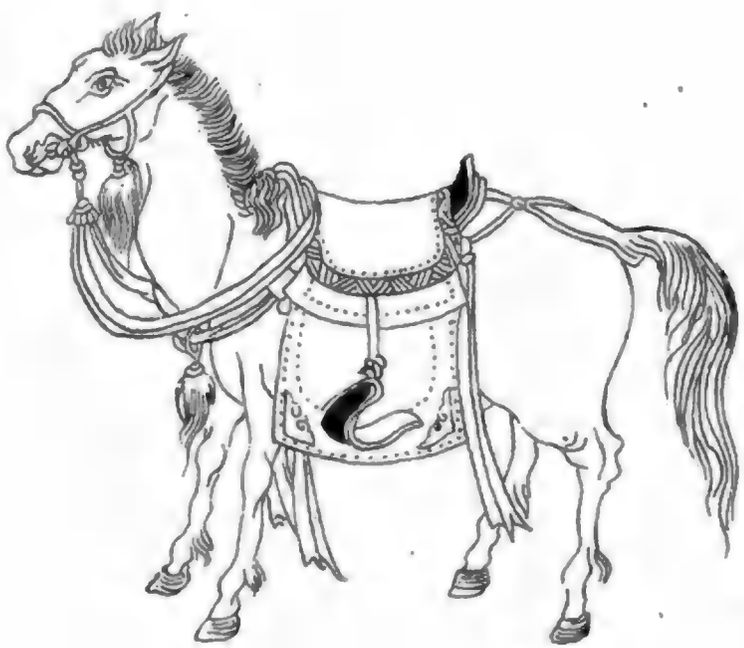
The language spoken by the Loochooans, so far as I can judge at

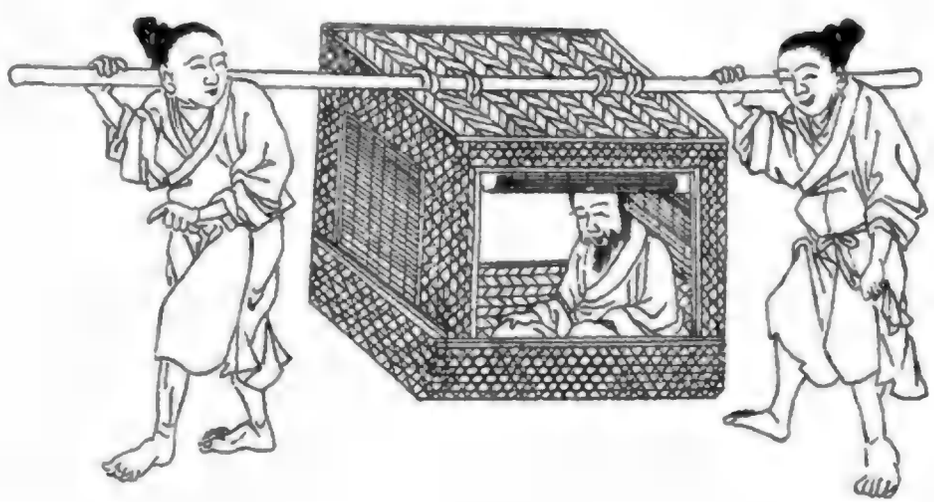
present from a vocabulary which Dr. Willis has kindly sent to me from Kagoshima, appears to differ very little from Japanese. One or two of the heads of the embassy now in Yedo, with whom I had an opportunity [9] of conversing a few days ago, spoke Japanese with perfect correctness. It is also stated that the higher officials are acquainted with the Court dialect of China. It would not be a hazardous conjecture to suppose that the Satsuma dialect of Japanese, which contains several words unknown in other parts of this country, is closely allied to the Loochooan tongue. This is, however, a subject which should be treated separately.

I will conclude with a free translation of the last page of the 'Short Account,' which, it must be remembered, was written in 1850, while the Tokugawa dynasty still flourished.

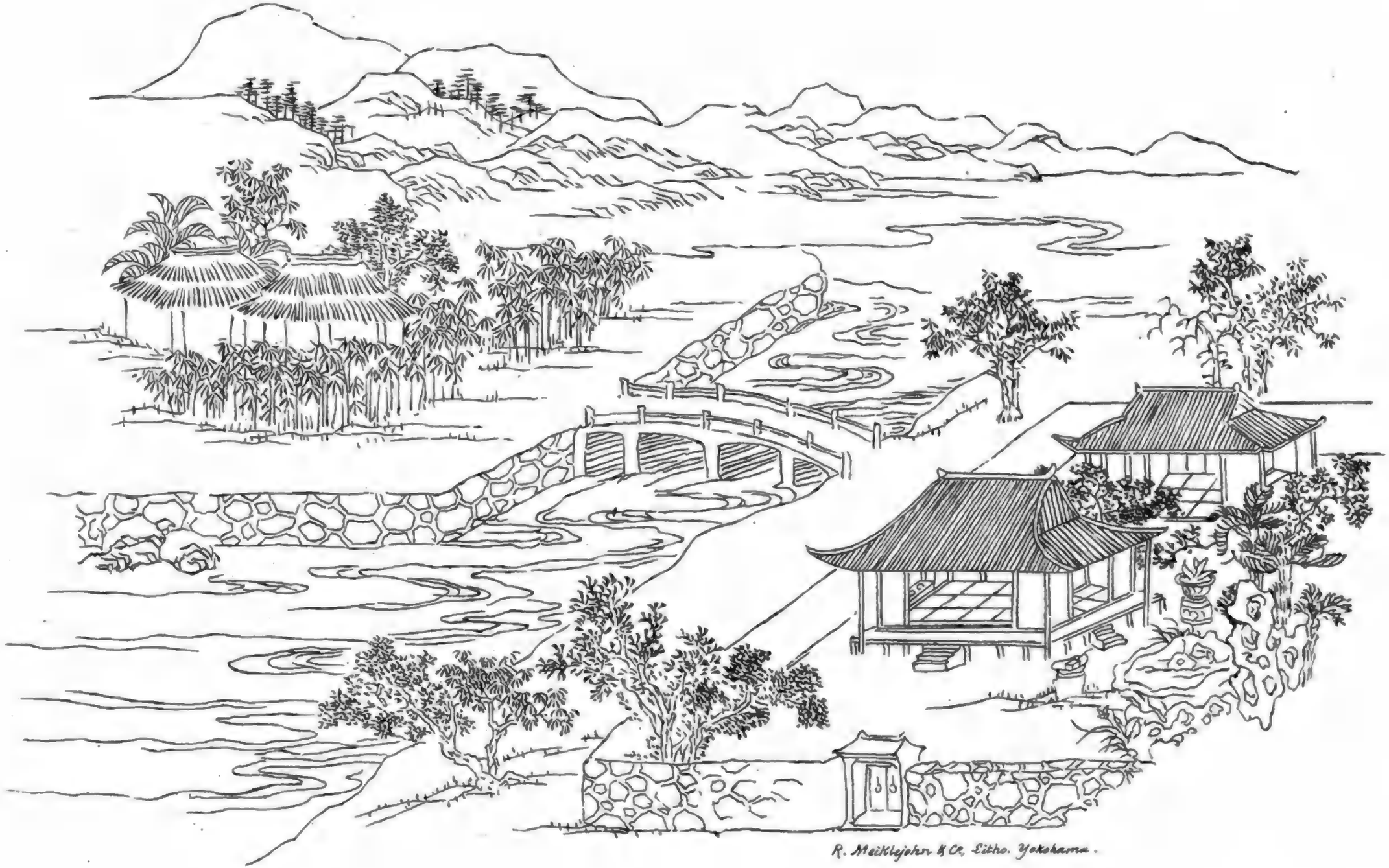
"Although Riukiu lies several hundred miles away in the sea to the south, it can easily be reached by ship. The temperament of the people and their manners and customs closely resemble those of our own nation. The countries which from ancient times have rendered homage to Japan are China, Corea, Riukiu and Holland. Intercourse with China is restricted to visits made to Nagasaki for the purpose of trading, while the Coreans have ceased to visit the capital in modern times, and though the Dutch visit the capital, their numbers do not exceed three individuals on any one occasion. The envoys who came with presents from Riukiu alone show evidence of appreciation of the perfect etiquette observed towards foreign barbarians by the glorious line which rules over us. Though every one is acquainted with the valour of the province of Satsuma, it would be difficult to parallel its glory, which has lasted through countless generations, even to the present day."

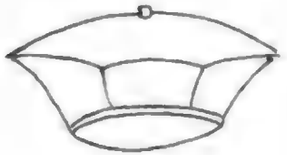
R. Maitlejohn & Co. litho: Yokohama.

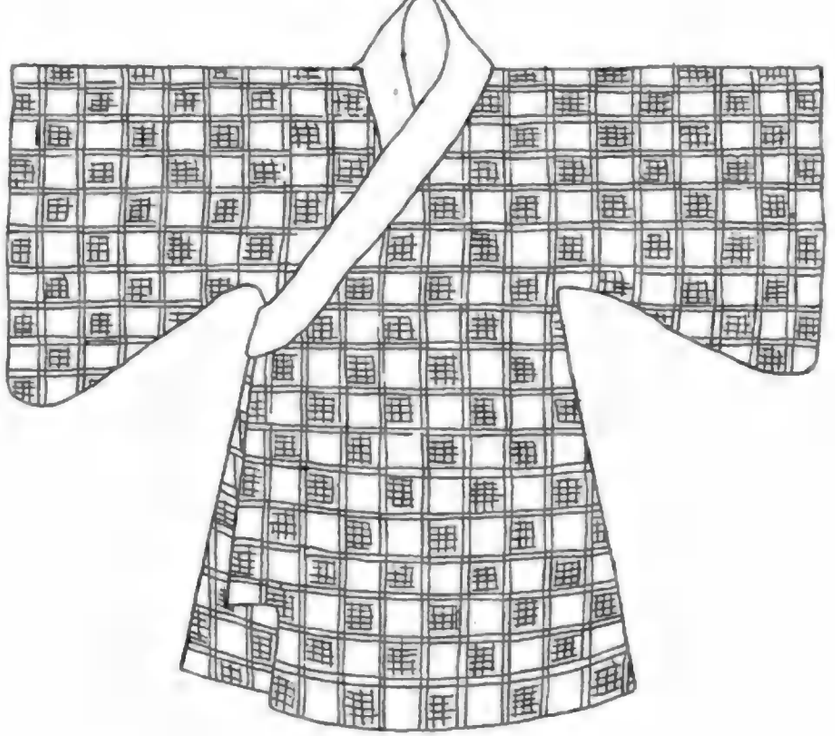


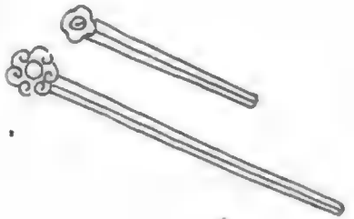


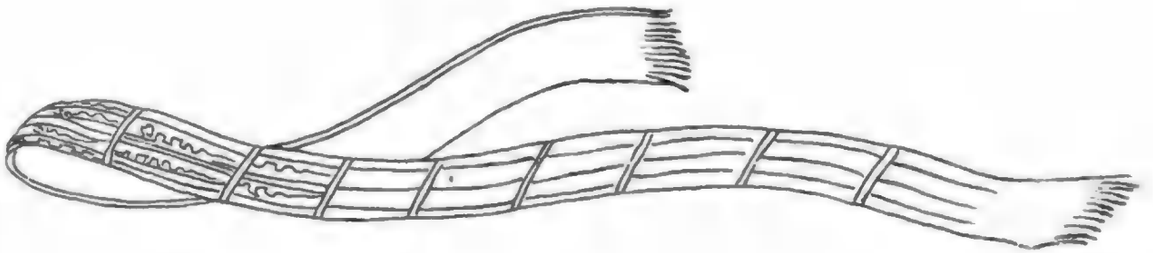
R. Maklejohn & Co, Litho. Yokohama.

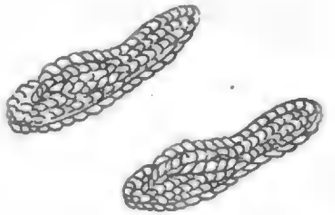

R. Meiklejohn & Co. Litho. Yokohama.

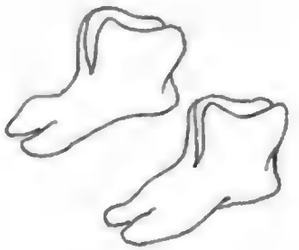












R. Meiklejohn & Co. Litho. Yokohama.

R. Meiklejohn & Co. Litho. Yokohama.

THE HYALONEMA MIRABILIS.

By Henry Hadlow, Surgeon, R.N.

[*Read before the Asiatic Society of Japan, on the 30th October, 1872.*]

[10] The Glass Plant, Glass Coral, or as it is now more generally and more correctly termed, the "Glass Rope Sponge" of Japan,—*Hyalonema Mirabilis*, as it was christened by Dr. Gray, and is termed by systematic writers,—is tolerably familiar in appearance to most residents in the East, either in its complete form, in which it presents a spongy expansion, sometimes large, sometimes small and of variable shape, having springing from it a very beautiful twisted coil of vitreous-looking cords, which itself is, for a part of its extent, invested and covered by a brown, warty bark-like structure; or as, perhaps, it is more commonly met with, in an imperfect condition, presenting only the glass rope and its attached bark without any trace of the spongy expansion from which it has probably been torn. We also sometimes meet with portions of the glass coil most ingeniously attached to and grouped with corals, shells and other marine products, which I need only refer to to remind you that such arrangements are entirely artificial, notwithstanding that they are often so artistically done as to have a most deceptively natural appearance, and that the way in which the coil is placed, with the free ends of the plume upward, has had, I imagine, considerable influence in persuading people that that was its ordinary mode of growth.

[11] The Hyalonema has long been a favourite with collectors from the intrinsic beauty of its form, whilst to the student of marine zoology it has a special interest from the peculiarities of its structure, the doubt that obtained as to the precise position it occupied in the animal

kingdom, and from an uncertainty, not even yet definitely set at rest, as to the true relation which the parts of which it is composed, namely the sponge head, the glass rope, and the so-called bark or polythoa, bear one to another.

Dr. Gray, who described the Hyalonema from some of the early specimens and gave it its scientific name, regarded the glass rope and its bark-like enveloping polythoa as an organism entirely independent of the spongy mass to which it was commonly found attached, and the glass rope with its coriaceous investment were described together as *barked coral*, the silicious twisted stem or axis being looked upon as the foot selection or *sclero-basic corallum*, as it is termed, of the compound polyp mass investing it and forming its bark. Dr. Gray considered its attachment to the sponge as merely parasitic and accidental, the sponge being supposed to form a fixed base from which the Hyalonema grew and projected like a plume. In a very trustworthy little work by Professor Reay Greene published in 1868, the Hyalonema are referred to the Actinozoa, although provisionally, and since that time our knowledge of them has increased. In 1868 it was reported that Hyalonemas had been discovered in the deep sea dredgings at Setubal on the coast of Portugal. It was first supposed that these must have been thrown overboard from some passing vessel returning from Japan, but other fresh specimens followed, and it became certain that the Hyalonema was a denizen of Portuguese waters. Since that time the deep sea dredgings of Setubal, carried on at depths of 300 and 400 fathoms, have been a kind of happy hunting-ground for marine zoologists. A fine collection has been secured for Lisbon. Professor Percival Wright was successful in finding specimens, some living, and some of large size, and has shown us that our original opinions were founded in [12] mistake, and that so far from the sponge being the fixed mass it is the glass rope which dips deeply into the mud or sand and forms a kind of anchor for the sponge head, probably being secreted by it for that purpose, and that it is not a mere growth attached parasitically to the sponge, but an essential part of its constitution. Professor Wyville Thomson has also been engaged in the capture and study of these forms, and has promised a memoir on the genus, which is impatiently looked for by all interested in the subject. I have not, however, heard of its ap-

pearance yet, and in the meantime, there are many points of interest and many structures of great beauty which we can discover for ourselves with a little expenditure of time and patience.

The sponge mass of the Hyalonema is perhaps most commonly cup-shaped, with the glass rope attached to its inner concave surface. Sometimes it is more or less globular, with the glass rope running through it and attached to nearly the whole length of the long axis. As you see in the specimen before you, it is sometimes of considerable size, eight or nine inches in its longest diameter. It must be remembered that in a dried specimen such as those before us, just as is the case with the common sponge of our toilet table, what we see is the mere framework or skeleton of the actually living sponge. During the life and growth of the sponge this skeleton is clothed with a soft semi-fluid gelatinous coating called sarcode, which is the really truly living matter of the organism; by which it breathes, by which it takes its food, by which it propagates and multiplies its species, and by which the skeleton, and the spicules of which I shall have something to say hereafter, are formed and secreted. Time will not admit of our discussion of this sarcode matter. I can only stay to remind you that it is not a mere homogeneous layer like a stratum of jelly, but that it contains an immense number of small sarcode cells or amœboid bodies, more or less globular in shape, often provided with a long whip-like filament or flagellum, by whose lashing movements currents of water are kept circulating [18] over the little sarcoid for its aeration and nutrition; and lastly, that each little sarcoid has an independent vitality which enables it to live when separated from the parent mass, and under favourable circumstances to become the commencement of fresh sponge growths. Also the living sponge presents an aquiferous system, consisting of a series of anastomosing channels passing through its mass, through which currents of water are constantly passing, entering by the minuter orifices or pores, and escaping from the larger openings or oscula, in this way bearing floating nutritive material to the fixed sarcode matter and at the same time aerating the whole animal. Such are the general characteristics of living sponge; the skeleton which we see in dried specimens is, in the ordinary sponge of every day life, composed of horny material in form of tubes, in composition resembling animal matter, and of a softness and elasticity which gives it its domestic value.

These sponges are called keratose or horny, and form one of the three groups into which sponges are divided by the nature of their skeleton. In a second order the framework is calcareous, composed of carbonate of lime, and there is yet a third to which Hyalonema belongs, in which the skeleton is silicious. Whatever may be the composition of the fibres forming the framework, they are arranged always in an intricate network, thus securing the peculiar cellular structure which sponges possess. For the purpose of strengthening the skeleton and assisting in giving support to the semi-diffluent sarcode matter, we also find, especially in the calcareous and silicious sponges, what are termed spicules, that is, calcareous or silicious particles of definite form, generally slender, acicular, sometimes needle-like in shape, in other cases assuming very graceful and elegant forms. The Hyalonema is particularly rich in these, but as we shall have to return to them in speaking of the polython or bark, it will be convenient to consider them then.

So far we have met with little in the general formation of Hyalonema different from siliceous sponges generally, nothing indeed, except the variety of beauty of the spicules [14] which we shall describe presently, but the glass coil or glass rope is a structure altogether new. As we have already seen, it was originally thought not to be a portion of the sponge at all, but the foot secretion of an Actinia. It is now more commonly regarded as an integrant part of the sponge itself, chiefly from the fact that we have recently become acquainted with several other sponges similarly provided with foot pieces or stalks serving as bases of attachment. We may, if you please, look upon the glass cords, as kind of gigantic spicules dipping down into the soft mud and ooze, and serving as an anchor. If we take a single filament of the cord and examine its structure, we find that it is not homogeneous as the thread of spun glass would be to which it has been compared, but that it is laminated,—composed of layer upon layer of silicious matter deposited round a central axis. This can be seen without much difficulty by breaking the glass fibre across in such a way as to produce an irregular splintered fracture, and examining the broken end under a low microscopic power. The appearance presented is shown in the sketch, taken from an object laid on the table, and in the

original it is easy to count more than twenty layers entering into the composition of the fibre. Towards each extremity of a fibre the number of layers is fewer and the fibre consequently tapers off, and as the fibres themselves do not extend the whole length of the coil, this likewise tapers off in the end which is attached to the sponge, and appears there to be tough and fibrous and securely attached to the spicules and network forming the skeleton of the sponge mass.

Mr. Carter, in his very interesting observations on the development of the fresh water spongilla, has described how the spicula of that organism are formed. He has shown that they first appear as a delicate line enclosed and developed within an elongated sarcode cell, and that they grow rapidly by external additions until they attain their full dimensions, soon outgrowing the cell in which they first appear. There can be little doubt that the filaments of the glass rope are developed in some more or [15] less analogous way, and that in the living state they are like the silicious skeleton of the sponge itself, clothed with sarcode matter from which layer after layer of silicious material is deposited as long as the fibre continues to live and to grow.

If we now examine the coriaceous envelope of the glass coil, or polythoa, which can be most easily done in dried specimens after it has macerated for a few days in water, we can easily make out that it consists of two layers, an inner one closely connected with some of the fibres of the glass rope, and which has been stated by some observers to extend between and invest each individual fibre of the glass coil which forms its axis;—I am, however, doubtful if this is the case; it does not appear to be so in the large specimens on the table;—and an outer thicker one which is largely made up of small particles of sand, broken shells, minute foraminiferæ, and here and there a diatom, mixed up with the beautiful spicules secreted by the organism itself. At first sight it reminds one of the little tubes which the terebellas build up from sandy and shelly particles and which you often meet with cast up on the sea shore. Studded about on the bark are little wart-like projections with flattened crowns, having in the centre a small depression or orifice with little radiating grooves proceeding from it. If, in a macerated specimen, we make with a sharp knife a thin section from without inwards, taking care to include the central depression, and then examine it with a com-

mon lens, we shall observe, supposing our section to have been a tolerably successful one, much the appearance which you see drawn here, the original of which is on the table. We see that the innermost of the two layers of the bark passes under the little cup-like projection, all together forming the base of the included cavity; whilst the thicker external layer, separating from the inner one, is raised up, forming the wall and crown of the tubercle until it reaches the central depression, where it turns inwards, forming a small funnel-shaped process which opens into the general cavity of the structure. This at once reminds us of the formation of the Actinozoa, [16] which consists of a simple digestive, or stomach tube, open at both ends, and suspended in the centre of the polyp by little partitions called mesenteries; indeed, the resemblance to an ordinary zoantharian is so close that we cannot feel any surprise when Dr. Percival Wright tells us that in living specimens brought up from the deep-sea soundings at Setubal, he has observed the little wart-like projections of the bark expanding their tentacles in search of food just like the common sea anemone of our aquaria, or any other zoantharian. It is a compound polyp; that is, although each little nipple-like projection has its own digestive sac, and its own prehensile organs or tentacles by which it secures its own food, they all unite together to contribute to the growth of the compound mass of which they form part. Such being the case, it is clear that the polythoa, or coriaceous investment of the glass rope, must be an organism totally distinct from the sponge mass, whose nutrition we have already seen to be derived from the currents of water flowing through its aquiferous channels. If we admit the silicious stem or glass rope to be an essential part of the spongy portion, we shall be constrained to regard the polythoa as a mere parasitic investment, and having no structural relations with the sponge and its glass coil at all. There are still, however, some observers who consider that from the universality with which the bark is found coating the glass rope and no where else, and from its containing peculiar silicious spicules, that these two, the polythoa and glass rope, form one organism which may exist independent of the sponge at all, as was first supposed, and they consider such specimens as these, in which no trace can be discovered of the spongy expansion, and the glass coil is

coated to its extremity with polythoa, as strongly favouring this belief. It is perhaps premature to pronounce dogmatically either way, although the first of these views—that is, of the parasitic nature of the polythoa—meets with almost universal acceptance.

What, then, are these spicules of which so frequent mention has been made? They are easily obtained for [17] examination. If we put a few particles of the polythoa, or some fragments gently torn from the inner surface of the sponge, into strong nitric acid for a day or twos the animal and extraneous matter will dissolve away, and the siliciou, particles, including the spicules, will alone remain. These must be well washed in many waters to remove all traces of the acid, and will then be ready for examination with the microscope, or for mounting in Canada balsam, if it is desired to keep them as permanent objects; taking care, in the latter case, not to break the more delicate forms by too much pressure on the covering glass. Proceeding thus with the polythoa, we find that the spicules have a great tendency to assume the cruciate form, the most common of all being described in scientific terminology as *cylinuro-cruciform with densely spiculate shafts*. In some other forms, the shafts of the cross are spiculate only at the extremities, and are much more delicate in contour. We meet with others in which the lateral shafts of the cross are reduced to mere rudimentary projections, whilst still in others they are absent altogether and the spicule is a short thick cylinder studded all over with sharp spines. Of these straight or nearly straight spicules we find several kinds, some spinous only at the ends, others with a small central enlargement, and lastly we meet with delicate spicules, some in the form of crosses presenting perfectly smooth outlines. In the sponge, some of the commonest, although not the most striking, forms, are these *spiculated cruciform spicules*, with a little foot-piece in the form of a cross from which springs a much spiculate stem. Dr. Wright tells us that these are chiefly found round the oscula or openings of the aquiferous channels and lining the cavities of the sponge, attached by the little foot piece to the sarcode mesh. He says,—to quote his own words—"From the peculiar way in which they are placed on the edges of the meshes, and from the fact that the barbs on the stem of the spicules all point in one direction, it

is possible that while it would be easy to glide over the slimy sarcode down into an osculum, return would be no easy task, as [18] any solid body would be at once caught and retained by the barbs." It is, however, only in fresh specimens, or in those which have been at once put up in preservative, that these can be properly seen in their natural position; in the dried sponge they are so loosely attached as generally to become separated.

Amongst other forms to which we can only briefly refer, are many of delicate cruciform shape, much resembling the foot piece of the spicules last described. Some are large and present the appearance of four radii springing at right angles from a central axis, hexradiate. We also find a number of peculiar kedge-like forms, some very simple, others larger, passing through various gradations of size, but leading up to the magnificent spicule described in scientific terms as "*multihamate birotulate, shaft slight, cylindrical, papillate.*" It might be roughly compared at first glance to two open umbrellas made of the finest spun glass with their sticks fused into one, but the true structure of the expanded portion is shown here, delicate silicious leaves curving gracefully from each extremity of the shaft towards its centre.

There are many other forms of spicules to reward the painstaking microscopist who searches for them, some of them minute and requiring the higher powers of the instrument and careful examination of the lighter washings, but the most beautiful and distinctive are those which we have seen and which can be easily demonstrated with the most ordinary microscope.

In conclusion, I would venture to impress upon you that there is a great deal yet to be discovered concerning this very interesting and curious sponge, which can only be learned by the careful examination of fresh specimens in the natural condition in which they are brought up from their ocean bed, and it is chiefly with a view of enlisting amongst the ranks of the observers any of my hearers who may be passing a holiday at Enoshima or the neighbourhood from which the sponges are brought, that these few brief notes of the Hyalonema are brought before your notice. The discovery, for example, of a young specimen complete [19] in sponge head and glass rope, but without

the coriaceous investment, would be of the highest scientific value. The verification of the observation that the little warty projections of the bark have their own tentacles and their own mouths, would have its interest, and the discovery of the bark-like polythoa, coating other structures altogether apart from the glass rope, would all aid us in clearing up matters yet in doubt, and help to give us a clearer view of the very interesting but not yet fully understood HYALONEMA MIRABILIS.

THE STREETS AND STREET-NAMES OF YEDO.

By Professor W. E. Griffis.

[*Read before the Asiatic Society of Japan, on the 14th December, 1872.*]

[20] The history of the streets of a city is often a history of the city itself. The names of the thoroughfares of a nation's metropolis frequently mirror the national history. Such names become, in after ages, an index to the past, and, like rare fossils, exhibit to the mind of an antiquarian whole strata of forgotten history. Were one to be blindfolded and set down in Paris, the street names alone would tell him that he was in France, and from these names, he might read aright the story of the many victories of glory-loving France. The sight of the sign-board in the single street, Rue de l'Ecosse, would call up the history of the intrigues and long friendships of France and Scotland; and the eye of imagination might see the Highland sentinel pacing his rounds in the French capital, humming the airs of his bonny heath. The street-names of a nation's metropolis are often a true exponent of the national character, as well as of its history. Thus, while those of London, like those of Paris, tell of the national passion for war and glory, and all that is spectacular and heroic, they tell also of what is dear to humanity in all its phases, from the sublime to the most ridiculous. Of Philadelphia, Longfellow, in his "Evangeline," sings—

[21] "The streets still re-echo the names of the trees of the forest,
As if they fain would appease the Dryads whose haunts they molested."

We should perhaps make an apology for selecting so homely a subject as that which we bring before this cultured audience this evening. Let us see what may be learned from the street-names of the capital of the city of Japan, and how much light they throw upon the national character and history.

In the first place, we find an almost total absence of the names of great battle-fields, or places of victory, and indeed of nearly everything betokening military glory. Notwithstanding that Japan has been the theatre of conflict for many centuries, so that war may be said to have been the normal, and peace the exceptional condition of its inhabitants, and notwithstanding the invasion, conquest and long possession of Corea, it does not seem to have been the custom to record the names of battles or of victory in the street-names of the capital, as is the custom in Europe and America. Yet the reason is evident. Notwithstanding long civil wars and occasional warlike excursions, the natives of Japan delight to call their country the "Land of Great Peace," and a successful invasion of Japan has not yet been made. With the exception of Corea, Japan has been almost entirely without foreign enemies. For obvious reasons, none of the great victories gained by Japanese heroes over their own countrymen have found a monument in the street nomenclature of Yedo. It would have been unwise policy in the great unifier of Japan, Iyeyasu, to have given to the streets in the capital of a nation, finally united in peaceful union, any name that would be a constant source of humiliation, that would keep alive bitter memories, or that would irritate freshly-healed wounds. The anomalous absence of such names proves at once the sagacity of Iyeyasu, and is another witness to the oft-repeated policy used by the Japanese in treating their enemies, *i.e.*, conquer them by kindness and conciliation.

In the second place we have noticed that very few of the national heroes or really great men of Japan [22] are remembered in the street nomenclature of Yedo. Such a fact is significant, when we remember that the cities of Europe and America in their street names, give us, in many instances, excellent catalogues of their national heroes, statesmen, and scholars. In Yedo, the name of the warrior-emperor Hachiman is borne by several streets, usually by those which pass in front of, or issue from the shrines dedicated to Hachiman, who is also the god of war. Various individuals have had their own names transferred to streets, or have named them themselves, but these persons were mostly men of no renown, or at least of merely local fame; good, honest or wealthy nobodies, of whom no history speaks, and who were unknown except to their own friends and neighbours, and perhaps not heard of

beyond the smoke of their own dwellings. Several famous wrestlers have been honoured by having streets called after them, likewise several priests and nuns. A fencing-master, who appears as the central hero in one true narrative, and in a small host of romances, is celebrated among the people for having followed through many years and provinces the murderer of his father, whom he at last killed. He points the moral and adorns several of the many tales of Japanese revenge, which form the literary pabulum of the little children of Japan. The street which is named after him is Kanda Miyamoto.

While speaking of persons, it may be mentioned that near Nihon Bashi is the street formerly called Anjin Chô, after Will Adams, of whom we have read before, and whose sepulchre, thanks to the zeal of a recent discoverer, is known to be with us to this day. Near by Anjin Chô, though we cannot vouch for the truth of the statement, was another street, called Yayosugashi, which, as I have been informed by several natives, is the Japanese-Dutch for the name of a Hollander employed in the service of the Shôgun at the same time with Adams.

Knowing the populous character of the Pantheon of Japan, we might expect to find many streets called after the popular deities. Only a comparatively small number, however, have [28] received their names from this source, and even in such cases the streets take their names from temples situated in them. Two or three streets are named after the dragon, which, considering how omnipresent are the pictures of this fabulous ugliness on all things Japanese, is a noteworthily small number.

The chief idea prominent in the nomenclature of the streets of Yedo exhibits that trait of Japanese character which enters so largely into the national temperament—the passionate love of nature and natural scenery. Their beautiful country at once creates and satisfies their love of nature's beauty, and this feeling finds expression even in the street names. The latest official directory of Tôkiô contains the names of 1371 streets proper, and fully two-thirds of these have names derived from natural objects.

Since the peerless mountain is visible from many points, we are not surprised to find two "Fuji-san viewing" streets, and one "Suruga

Chô."[1] 'Willow,' 'Pine,' 'Stone,' 'Field' and 'Bamboo' streets are numbered by scores. We have a 'Pine' street in nearly every one of the ninety-six subdivisions of the city. It may be 'N.,' 'S.,' 'E.,' or 'W.' 'Pine.' It may be 'Front,' 'Side,' 'Rear,' 'Side,' 'Temple-facing,' or 'Hill-facing,' 'Pine.' Now it is 'Long Pine,' anon 'Little Pine,' 'Pine-foot,' 'Pine Branch,' 'Boat Pine,' 'Old Pine, 'Young Pine,' 'New Pine,' and so on, with many others. The willow, at one time, must have been a very common tree in Yedo, if we may judge from the number of streets called after it. All varieties and forms of bamboo flourish in the street nomenclature. Other specimens of botanical names are 'Mushroom,' 'Rice,' 'Rush,' 'Wild Cherry' (Sakura), 'Cedar' (Cryptomeria), 'Wormwood' (Artemisia), 'Peony,' 'Chrysanthemum' and 'Hollyhock.' As a kind of supplement to these, are 'Bouquet,' 'Sunny,' 'Morning Sun,' 'Sun-shade,' 'Grassy,' 'Double Root,' 'Mist,' 'Mound,' 'Pure Water,' 'Dew Moon,' 'Plum Orchard,' which in some cases have their names duplicated and triplicated.

Zoological names are not absent, as the following will [24] show. We have 'Tortoise,' 'Monkey,' 'Stork,' 'Badger,' 'Falcon,' 'Shark,' 'Bear,' 'Goose Nest,' 'Red Feather,' 'Young Pheasant,' 'Crow's Grove,' 'Twenty Horses' and 'Clam' streets; with many others of the same nature, the names of which occur several times in various parts of the city.

Next to natural objects in respect to number, are the names of indispensable articles used in everyday life. In a country where the houses are almost universally built of wood, timber is almost as necessary as food, and we are not surprised to find in Yedo more than a score of 'Timber' streets. 'File,' 'Pot,' 'Kettle' and 'Table,' etc., repeat their names several times. 'Salt' street is a very common one, and the same is the case with 'Norimono,' 'Wheel,' 'Indigo,' 'Mat,' 'Fan,' 'Kitchen,' 'Hair-pin,' 'Charcoal,' and 'Leather,' streets. There are several 'Net' and many 'Fish,' etc., the latter of which may be 'Fresh,' 'Roasted,' or 'Plain.' Of 'Calamus,' 'Oil,' 'Gum,' and 'Pantry,' streets, there is one each. 'Three Hats,' 'Sweeping,' and 'Cabinet' streets are known, and we almost detect an attempt to be funny, in the name given to certain streets like our courts, which have an entrance, but no outlet. These 'blind-alleys' are called 'Bag' streets.

[1] Fuji-san, or Fuji no yama, is situated in the province of Suruga.

As regards trades, 'Carpenter,' 'Blacksmith,' and 'Dyer' are the names most repeated, though there are also 'Sawyer,' 'Jockey,' 'Farmer,' 'Coolie,' and 'Sailor' streets.

What weapons were used by the warriors of Old Japan are told us in the street names of Yedo. We have 'Armour,' 'Helmet,' 'Arrow,' 'Bow,' 'Quiver,' 'Spear,' 'Sheath,' and 'Arrow-arsenal' streets.

Not to particularize to a wearisome extent, we shall mention but a few others: 'Row of Trees,' 'Same Friend,' 'Flower River,' 'Farmer's Lot,' 'One Colour,' 'Spirit Cave,' 'Peaceful,' 'Exist,' 'Congratulation,' 'King's Hand' (checkmate), 'Reaping Hook,' 'Lacquer,' 'Flock of Sparrows,' 'True Stone,' 'Myriad,' 'Brocade,' 'Cash,' 'Mint,' 'Silver Coin Mint,' 'Abounding Gladness,' [25] 'New Bloom,' 'Treasure Mountain,' 'Storehouse,' 'Tori-i' ('Birdrest,' or temple portal), 'Shrine Row,' 'Aqueduct,' 'Mountain Breeze,' 'Tomb-door,' 'Blue Mountain,' 'Monkey-music,' (name of an old comedy), 'Miôga,' (name of a disciple of Buddha, stupid, and of feeble memory; hence the name of an edible vegetable said to cause foregetfulness in the mind of the eater), 'Rich Bluff,' 'Conjugal Love,' 'Finger Valley,' etc.

Some of the wells in Yedo, besides being noted above others, have given names to streets; we have 'Bear's well,' 'Dyer's well,' 'Rock well,' 'Wild well,' etc. Many other streets are named from the guard-gate at which *octroi* was taken, and passports were examined. A few of them take their names from the bridges over which they extend.

After all the curious and suggestive bits of information that may be gained by a study of the street-nomenclature of Yedo, we must acknowledge that it exhibits in its frequent repetitions of the same names a poverty and lack of variety that can scarcely be explained except by assigning as a reason, what is in reality the fact; viz., that Yedo, like London or Philadelphia, was originally not one homogeneous city, but has become, in course of time, from the gradual agglomeration of many villages, a homogenous city. Indeed, this seems to be the order of history, and the law of growth, of almost every large city. At the present time the jurisdiction of Tôkiô Fu extends over 125 villages, which are considered as integral parts of Tôkiô. Originally the villages, which were finally ossified together, were more or less distant from each other, the extreme distance being as high as twelve miles.

The inhabitants of each village developed for themselves, as their needs arose, a system of street nomenclature, which, being the reflection of their life, surroundings and necessities, was, in each case, independent; and yet in the totality, from the nature of the case, these were identical. 'Timber Street,' 'Carpenter Street,' 'Pine Street,' 'Willow Street,' 'Bamboo Street,' would naturally be the first names. Then when a second 'Timber Street,' [26] would be laid out, the former one would be called 'First,' or 'Original' 'Timber Street,' and the succeeding namesakes would be dubbed 'N.' 'S.,' 'E.,' 'W.,' 'Front,' 'Rear,' 'Timber Street,' as the case might be. When all these villages agglutinated together, there would be several scores of 'Timber,' 'Blacksmith,' 'Pine,' and 'Willow' streets; just as in London were formerly, and perhaps are now, hundreds of 'Prince,' 'King,' and 'Queen' streets. In speaking of one of the many 'Pine' streets in Yedo, the name of the old village or district, or the new subdivision in which it is situated, must be mentioned to distinguish it from the others.

The names of Japanese streets are not marked on conspicuous signboards, as in European cities. Before each house, over the doorway, is pasted a slip of paper containing the name of the householder, the numbers and sexes of his family and household, the number of the house and the name of the street. At present the custom is coming in vogue of nailing up on the corners of the streets small boards containing the names of the streets and the numbers of the division or ward, and subdivision or precinct, of the neighbourhood. In many places, especially in the unbuilt or newly surveyed portions, small stakes, marked as above, are driven into the ground, and act as guide-posts. In directing a letter we must write the name of the person, street and number, the ward and precinct, and to avoid all mistake, the ancient name of the neighbourhood. These names are still tenaciously retained in the mouths of the people.

Iyeyasu made Yedo, then a comparatively insignificant town, his capital, about the year 1600. He gave new names to several of the principal streets, naming them after those in Shidzuoka,[1] but does not seem to have made any great municipal changes, and the

[1] Shidzuoka is the present name of the ancient city of Fu Chu, once the Shôgun's capital.

street nomenclature of Yedo remained, with scarcely any variations, until after the civil war, six years ago. The name Yedo (ye 'river' or 'bay'; and do, 'door') was changed to Tôkiô (tô [27] east; kiô, capital), and every name borrowed from Shidzuoka, or which could in any way recall the former power and glory of the house of Tokugawa was expunged, and new names were substituted. Some changes for the better were also made at this time. Many of the long streets having, as was formerly the case, a large number of local names given to their various parts, were called by a single name throughout their entire length, or else by the names, first section, second section, etc. About one-sixth of the street names were altered by this late act of the government, and it is of the streets of Tôkiô, and not of Yedo, that we have been speaking; that is, of the streets of the capital of Japan, as they exist now. The Japanese no longer recognize any such place as Yedo, and do not use the word. Foreigners, however, will very probably retain permanently the name Yedo.

The oldest part of the city of Yedo is the street called Temma Chô (Pack-horse [relay] street). Here, in ancient times, was one of the numerous travellers' stations on the route from the northern provinces to the southern. In the villages containing relays of horses, coolies, kago, etc., the Daimiôs and lesser folk could rest or lodge, obtain entertainment for man and beast, and fresh reinforcements of either. At the present day the people born in the immediate neighbourhood of Temma Chô, boast, with pride, their birth in the oldest part of Japan's capital, believing themselves to be therefore, Japanese of the Japanese, of specially pure blood, and peculiarly children of the Empire of the Rising Sun. The oldest avenue, or large street is called the Tôri, which begins at Shinagawa. From Shinagawa, the southern suburb, to Suji Kai Go Mon (Gate of the Inclined Plane), which is a little north of the centre of the city, the Tôri or Main street has, beside its general name, at least thirty local designations. Along the Tôri and the districts for a considerable distance east and west of it, throughout its length, is the chief business quarter of the city. Within the immense space of the castle were the residences of the large daimiôs and their retainers. The fortifications of the castle [28] are, to this day, not so much walls of defence against enemies, as stone lines of demarcation between the

merchants and the samurai. The general term for all people in Japan, who are not samurai, or of the privileged classes, is chô-nin ("street-man").

In treating of the thoroughfares of Yedo, the water communications must not be forgotten. By a glance at the map it will be seen that these are considerable in every quarter of the city. It is possible for a boat from Yokohama, or from the interior, to convey goods to almost any point within the castle moats, excepting points on the western side, and to many places in the northern and southern portions of the city. In the district called Fukagawa and Honjo, the canals are especially numerous.

Formerly, the city was divided into thirty districts or wards. At present, by an act of the Government, which went into effect the year before last (1871), the city is divided into six large divisions, each containing sixteen subdivisions. Formerly each street, or section of it, was under the superintendence of a petty officer, or monitor, who lived in the street over which he exercised supervision. Over these monitors, a ward officer, with assistants, presided. The house-holders were grouped together into fives, one of them being accountable for the others, and all acting as spies and checks upon each other. Under this system it was usually an easy matter to fix the responsibility of the origin of a conflagration, theft, riot, etc., upon the real offender. Every ward was surrounded either by canals, walls, or fences, the entrance to which were closed by guard gates. In case of disturbances of any kind, it was comparatively easy to shut the gates, and confine the infection of disease, riot, etc., to a single ward. At present the old system of municipal government having been done away, the city is governed by a body of about 3,500 policemen, who are of two grades; the one being that of the simple constable, and the other being invested to a very limited degree with the powers of a magistrate. The basis of the organization, division and local duties of this force, is the same as that of the divisions of the city, [29] there being ninety-six station houses in the various parts of the city. We hazard the belief that there is no other city in the world in which the public peace and order are better kept, or in which the safety of the inhabitants is better secured.

The streets of Yedo are in general wide and spacious, and are kept well repaired. They are usually straight, and run between opposite cardinal points of the compass. Within the castle, the avenues, especially along the moats, were originally made for the spectacular displays of feudalism, and though the Daimiôs' trains no longer glitter and impress the mind of spectators with scenic effect, the wide avenues on which these glories of a by-gone age were once displayed, still remain to adorn the great city which is the capital of new Japan.

THE GEOGRAPHY OF JAPAN.[1]

By E. Satow, Esq.

[*Read before the Asiatic Society of Japan, on the 22nd March, 1873.*]

[80] Dr. Cornwell's School Geography, a book which had reached its 47th edition in 1870, and may therefore be supposed to have a large circulation, informs us that 'Japan consists of Niphon, Kiusiu, Sikoku, the dependencies of Jesso, the South Kouriles, and the south part of Saghalian.'

To say nothing of the incorrect spelling of the names in this sentence, it contains one error which every writer on Japan appears to have committed, and which demands immediate attention. This error consists in restricting the application of the name Nippon, or Nihon, to the largest island of the Japanese group, whereas it denotes in reality the whole of the empire. Amongst the numerous peculiarities of Japanese geography, none is perhaps more curious and more difficult to understand at first sight than this, although when the manner in which the country is divided is clearly pointed out, the necessity for giving a separate name to the main island seems less absolute than would be imagined.

A native manuscript entitled *Kō-koku chi-ri Riaku*, or 'A Short Geography of the Empire,' says: "From the most ancient times until lately Japan did not consist of more than sixty-eight provinces, namely, the five home provinces, the seven circuits, and the two islands, but in the winter of the year before last (1868) it was [81] redivided into eighty-four provinces, namely, five home provinces and eight circuits."

The *Go-Ki-nai* or five home provinces, are Yamashiro, Yamato, Kawachi, Idzumi and Settsu. The seven circuits are the Tô-kai-dô, Tô-san-dô,

[1] Revised by the Author.

Hoku-riku-dô, San-in-dô, San-yô-dô, Nan-kai-dô and Sai-kai-dô. The first division of Japan into provinces was made by Sei-mu Tennô, A. D. 131-190, in whose time the jurisdiction of the Mikado did not extend further north than a line drawn from Sendai Bay to somewhere about Niigata, the rest of the island, namely the subsequent province of Dewa and part of Mutsu, being still occupied by the barbarous tribes of whom the Ainos are probably the remaining descendants. What in 1868 constituted sixty-six and a half provinces was divided by him into only thirty-two.[2] In the third century the Empress called Jin-gô Kô-gô, after returning from her victories in Korea, divided the country into five home provinces and seven circuits, in imitation of the Korean arrangement. In the reign of Mommu Tennô (696-707) some of the provinces were sub-divided, so as to increase the whole number to sixty-six. The boundaries then fixed by him were re-surveyed in the reign of Shô-mu Tennô (728-756) by Ki-bi Dai-jin and the Buddhist priests Giô-gi and Tai-shô, to whom the task was confided by that Mikado. They are said to have buried charcoal in the earth at points on the boundaries, that being the most imperishable mark which they were able to devise.[3]

The old division is as follows :—

The Go Ki-nai, or Five Home Provinces are :—

Yamashiro[4]	or	Jô-shiu.
Yamato	"	Wa-shiu.
Kawachi	"	Ka-shiu.
Idzumi	"	*Sen-shiu.*
and *Settsu*	"	Ses-shiu.

[82] The Tô-kai-dô, or Eastern-Sea Circuit, comprises fifteen provinces, namely :—

Iga	or	I-shiu.
Ise	"	*Sei-shiu*
Shima	"	Shi-shiu.
Owari	"	*Bi-shiu.*
Mikawa	"	*San-shiu.*
Tôtômi	"	*En-shiu.*

[2] *Kô-chô En-kaku Dzu-kai.*

[3] *Chikata Han-rei Roku*, Vol. I. ff. 20, 21.

[4] The names given in italics are those most in use.

	Suruga	or	*Sun-shiu.*
	Idzu	"	Dzu-shiu.
	Kai	"	*Kô-shiu.*
	Sagami	"	*Sô-shiu.*
	Musashi	"	*Bu-shiu.*
	Awa	"	*Bô-shiu.*
	Kadzusa	"	Sô-shiu.
	Shimôsa	"	Sô-shiu.
and	*Hitachi*	"	Jô-shiu.

The Tô-san-dô or Eastern-mountain Circuit, comprises eight provinces, namely :—

	Ômi	or	*Gô-shiu.*
	Mino	"	Nô-shiu.
	Hida	"	Hi-shiu.
	Shinano	"	*Shin-shiu.*
	Kôdzuke	"	*Jô-shiu.*
	Shimotsuke	"	*Ya-shiu.*
	Mutsu	"	*Ô-shiu.*
and	*Dewa*	"	U-shiu.

The Hoku-riku-dô, or Northern-land Circuit, comprises seven provinces, namely :—

	Wakasa	or	*Jaku-shiu.*
	Echi-zen	"	Es-shiu.
	Kaga	"	*Ka-shiu.*
	Noto	"	Nô-shiu.
	Et-chiu	"	Es-shiu.
	Echi-go	"	Es-shiu.
and	*Sado* (Island)	"	Sa-shiu.

The San-in-dô, or Mountain-back Circuit, comprises eight provinces, namely :—

	Tamba	or	Tan-shiu
[33]	*Tango*	"	Tan-shiu.
	Tajima	"	Tan-shiu.
	Inaba	"	*In-shiu.*
	Hôki	"	Haku-shiu.
	Idzumo	"	*Un-shiu.*

Iwami	or	*Seki-shiu.*

and *Oki* (group of islands).

The San-yô-dô, or Mountain-front Circuit, comprises eight provinces, namely:—

Harima	or	*Ban-shiu.*
Mimasaka	"	*Saku-shiu.*
Bi-zen	"	Bi-shiu.
Bit-chiu	"	Bi-shiu.
Bin-go	"	Bi-shiu.
Aki	"	*Gei-shiu.*
Suwô	"	Bô-shiu.
and Nagato	"	*Chô-shiu.*

The Nan-kai-dô, or Southern-sea Circuit, comprises six provinces, namely:—

Kii	or	*Ki-shiu.*
Awaji (island)	"	Tan-shiu.
Awa	"	*A-shiu.*
Sanuki	"	San-shiu
Iyo	"	Yo-shiu.
and *Tosa*	"	*To-shiu.*

The Sai-kai-dô, or Western-sea Circuit, comprises nine provinces, namely:—

Chiku-zen	or	Chiku-shiu.
Chiku-go	"	Chiku-shiu.
Bu-zen	"	Hô-shiu.
Bun-go	"	Hô-shiu.
Hi-zen	"	Hi-shiu.
Hi-go	"	Hi-shiu.
Hiuga	"	Nis-shiu.
Ôsumi	"	Gû-shiu.
and Satsuma	"	*Sas-shiu.*

The two islands are:—

[84] Tsushima	"	*Tai-shiu.*
and *Iki*	"	I-shiu.

It will be seen from a comparison of this list of geographical divisions that the main island contains the Go Ki-nai, Tô-kai-dô, Tô-san-dô,

Hoku-riku-dô, San-yô-dô, San-in-dô and one province of the Nan-kai-dô. To use the names of these divisions is just as convenient for a Japanese as to use a collective name, like that which foreign geographers have misapplied to the whole island. The explanation of the anomaly is, therefore, that it has never been felt. The smaller of the two adjacent islands, namely Shi-koku (or the Four Provinces), contains the rest of the Nan-kai-dô; while the Sai-kai-dô exactly corresponds to the third island, Kiu-shiu, or the Nine Provinces. Europeans repeatedly confuse this island with the province of Ki-shiu, on account of the resemblance of the two names. The fact that the names of these divisions are all derived from Chinese words confirms the statement that the system has emanated from Korea, in which country the Chinese language seems almost universally to have furnished the names of places. Every province, except the eleven of the Hok-kai-dô, and the seven into which Ô-shiu and Dewa have been recently divided, has two names, one generally of pure native derivation, the other composed of the Chinese word *shiu*, a province, added to the Chinese pronunciation of one of the characters with which the native name is written. In many cases the pedantic Chinese name has completely superseded the original Japanese name in the mouth of the people, in a few both are used concurrently, while in some the original name is retained. For instance, Kô-shiu, Shin-shiu and Jô-shiu have replaced Kai, Shinano and Kodzuke. Ise and Sei-shiu, Sagami and Sô-shiu, Tosa and To-shiu are used concurrently, while Yamashiro, Yamato and several more have been retained. In such cases as Hi-go and Hi-zen, where the Chinese form is the same for both, it is not adopted in speaking, though it sometimes is in books, to the great confusion of the careful reader. Hi-go and Hi-zen were formerly one province, called Hi no Kuni, or 'the Province of Fire.' Echi-zen, Et-chiu and [85] Echi-go are three of the modern divisions of Koshi no Kuni, of which the present provinces of Kaga, Noto, U-zen and U-go also formed a part. *Echi* being the pronunciation of the Chinese character with which *Koshi* is written, the division nearest to the capital was called Echi-zen, or 'front of Koshi,' the next Et-chiu, or 'middle of Koshi,' the furthest Echi-go, or 'back of Koshi.' Kaga and Noto originally formed part of Echi-zen. Dewa in like manner was part of Echi-go. Chiku-zen and Chiku-go are the two divisions of the ancient province of Tsukushi, a

name which was applied in the most remote times to the whole of Kiu-shiu. Bu-zen and Bun-go also constituted one province under the name of Toyo. Tamba and Tan-go were formed out of one province called Taniwa, Tamba being a corruption of Taniwa, and Tan-go simply 'back of Taniwa.' Kadzusa and Shimôsa are contractions of Kami-tsu-fusa and Shimo-tsu-fusa, 'upper and lower Fusa,' while Kôdzuke and Shimotsuke are Kami-tsu-ke and Shimo-tsu-ke, upper and lower Ke, *tsu* being the archaic generic particle 'of.' The whole subject of the derivation of the names of the provinces of Japan is well treated in the '*Sho-koku Mei-gi Kô*' of Saitô Hikomaro, a pupil of the elder Motoori.

Another division of Japan was made by taking the ancient barrier of Ôsaka on the frontier of Ômi and Yamashiro as a central point, the region lying on the east, which consisted of thirty-three provinces, being called the Kwan-tô, or East of the Barrier, and the remaining thirty-three being called Kwan-sei, or West of the Barrier. This distinction is no longer maintained, the term Kwan-tô (or Kan-tô) being applied at the present day to the eight provinces of Musashi, Sagami, Kôdzuke, Shimotsuke, Kadzusa, Shimôsa, Awa and Hitachi. Sometimes the four provinces of Idzu, Kai, Dewa and Mutsu are also included in the term.

Chiu-goku, or Central Provinces, is a name in common use for the San-in-dô and San-yô-dô taken together. *Sai-koku*, or Western Provinces, is an ordinary synonym for Kiu-shiu, which in books is frequently called Chin-sei.

[36] For the purposes of taxation the country was again divided into Kwan-tô suji and Kamigata suji, of which the former comprised the twelve provinces just named, while the latter included the rest of Japan. In common language the term Kamigata is applied vaguely to Kiôto and the country round.

The islands of Iki and Tsushima are not included in any of the Seven Circuits, but form a division by themselves.

The province of Mutsu or Ô-shiu formerly extended beyond the northern shore of the main island, and included the territories of the *dai-miô* of Matsumaye, while the name Yezo, miscalled Yesso by most Europeans, was given not to the whole island, but to that part inhabited by the barbarous tribes.

In 1868, after the rebellious *dai-miôs* of Ô-shiu and Dewa had

submitted to the Mikado, those two provinces, which far exceeded in extent any others in the country, were subdivided, Dewa into U-zen and U-go, Ô-shiu into Iwaki, Iwashiro, Riku-zen, Riku-chiu and Mutsu, for obvious political reasons. At the same time the island containing the Matsumaye territory and the settlements of the Aino and the southern Kuriles were named Hok-kai-dô, or Northern Sea Circuit, and divided into eleven provinces, namely Oshima, Shiriboshi, Ishikari, Teshiwo, Kitami, Ifuri, Hitaka, Tokachi, Kushiro, Nemuro and Chishima, the last comprising those of the Kurile islands which belong to Japan.

The Japanese word *kuni*, which I have rendered by province, seems literally to mean 'country,' and province must be taken in the sense in which it was used in the maps of France previous to the revolution of 1789. The word *kôri*, which is used by the Japanese for the subdivision of a province, would be best translated 'department.' The number of departments in a province varies according to its size. In the old system there were altogether 629 departments, but the addition of the Hok-kai-dô has raised the number to 715.

[37] For purposes of administration all Japan except the Hok-kai-dô was again divided in 1872 into three *Fu* and seventy-two *ken*, without regard to the boundaries of the provinces. *Fu* might well be translated city, and *ken* prefecture. The three *Fu* are Yedo, Ôzaka and Kiôto, but it would be impossible to give the names of the prefectures, as a process of amalgamation is going on just now which will considerably diminish their number. The names, also, of some of the prefectures have been changed since the list was first published by the government.

The whole number of islands in the Japanese group, exclusive of the four main islands, is stated to be over three thousand. Many of these are so small as hardly to deserve the title, while others are large enough to constitute provinces by themselves. Beginning from Yedo and going westwards the first island of importance is that called Idzu no Ôshima, or, the Big Island of Idzu, by natives, and Vries', or Barneveld's island, by Europeans. It is the most northerly of a chain which extends as far south as the 27th degree of north latitude. Next to Vries come Toshima, then Niijima, Shikine jima, Kôdzu shima, Miyake jima and Mikura jima. All these lie north of the Kuroshiwo, or as we call it, the

Japan current. South of the Kuroshiwo, at a distance from Mikura jima estimated variously by Japanese at 66, 102 and 171½ miles, lies the island of Hachi-jô, or Fatsisio as it is spelt in our charts. Fifty miles further south is Awo-ga-shima, which, to judge by its delineation in the Japanese book of charts, is an extinct volcano. An interval of 341 miles separates Hachi-jô from the Bonin group, which consists of two large islands separated from each other by 50 miles of sea, and a host of islets. Europeans have corrupted the proper name Munin jima, which means 'Noman's islands,' into Bonin. Ogasawara jima is another name given to the group by Japanese. The next island proceeding westward is another Ôshima lying at the south of Kii, and separated from it by a narrow strait. South of Kiu-shiu extends another long chain, which may be said to begin with Tane-ga-shima [38] opposite to the province of Ôsumi and to end with Hateruma, the most southerly of the Yayeyama group, which lies close to the 24th parallel of north latitude. Yayeyama is called Pachusan in Keith Johnston's Royal Atlas, but that is not the name given to it by the natives. The ordinary maps of Japan do not include any of the islands south of Yaku no Shima.

Due west of the province of Satsuma lies the group called Koshiki jima, and north of this, close to Hi-go, the islands of Amakusa and Togi. Off Hi-zen, in a line stretching in a south-westerly direction, are Hirado, known to the early navigators as Firando, and the Go-tô, or Five Islands, namely, Fukuye, Kuga, Naru, Wakamatsu and Nakatsushima. This group contains innumerable smaller islands besides these five. North again of these are situated Iki and Tsushima, each of which constitutes a province by itself. By them lay, in former times, the ordinary route from Japan to Korea. On the north-west coast lie the Oki group, consisting of one large and three small islands, which is a province of the San-in-dô, and Sado, which also constitutes a province by itself.

The Inland Sea contains countless islands. The most note-worthy amongst these are Ôshima, or Yayoshima, off Suwô, Itsukushima or Miyajima, east and west Nomi-jima off Gei-shiu, and Shôdzu shima off Bi-zen.

Besides the five small islands on the west of the Hok-kai-dô, the Japanese claim Kunashiri and Etorofu, the largest of the Kurile islands.

Promontories of course abound along the Japanese coast. Begin-

ning with the extreme north of the main island we have Riuhi zaki and Fujishi zaki in the Tsugaru Straits. Passing down the east coast we come next to Kuwa-ga-saki in Riku-chiu, close to the harbour of Miyako, Misaki near the port of Kesen in Riku-chiu, Kin-kwa-zan, near Matsushima in Riku-zen, and Inuboye no saki, wrongly called Inaboye no saki in our charts, just below the mouth of the Tone-gawa. Su-no-saki in Awa, and Miura no misaki, called Cape Sagami by us, mark the entrance to the Bay of Yedo. Next come Cape Idzu, [39] Omaye-zaki in Tôtômi, Irako zaki in Mikawa, Mugi-zaki in Shima, Idzumo-zaki and Shiwo no misaki, both at the extreme south of Ki-shiu. Hii no misaki further up the west coast of Ki-shiu is an important landmark for the seaman. Muroto-zaki and Ashizuri no misaki are the chief promontories on the southern coast of Shi-koku, both being situated in Tosa. Tsutsui-zaki in Hiuga and Sata no misaki, or Cape Chichakoff, in Ôsumi are well known names, especially the latter. South of Nagasaki lies Nomo ga saki, and Shijiki-zaki at the south-west end of the island of Hirado. After rounding Misaki on the west coast of Nagato, the next cape of any importance is Suzu no misaki in Noto. From this point up to the Straits of Tsugaru the coast is almost straight, with the exception of the large projecting headland between the harbours of Akita and Noshiro in U-go. This is hardly small and sharp enough, according to Japanese ideas, to be distinguished as a promontory.

The chief promontories on the coast of the Hok-kai-dô are, Nosshamu misaki, Erimo misaki, Esan misaki, Yagoshi no misaki, Okamui-zaki and Shirushi mizaki.

There is another peculiarity of Japanese geography which deserves to be noticed. Although the Japanese possess a fine map of the coast line of Japan and an elaborate set of charts for the use of junks, and are generally acquainted with the seas in the immediate neighbourhood of their own country, they do not give any names to the bays which abound along the coast, nor to the straits which separate them from other countries or divide their own. The bays of Yedo, Ôzaka and Owari are not known by those titles. The straits of Tsugaru (often miscalled Saugur in our maps), of Shimo-no-seki, of Akashi, of Idzumi, etc., have received their appellations from European navigators, as much as those of Van Diemen, Colnet, Von Krusenstern and La

Perouse. The term *seto* is applied by them only to narrow channels. On the other hand they make use of the terms *oki*, offing, and *nada*, sea, very freely. Thus, in going from Yokohama [40] to Nagasaki they traverse the Sagami Nada, Tôtômi or En-shiu Nada, Ten-riu Nada, Bin-go Nada, Suwô Nada, Gen-kai Nada, Hibiki Nada, and Matsura Nada. Suwô Nada has often been supposed to be the proper equivalent for what we have naturally called the Inland Sea, but it simply means the sea adjacent to the province of Suwô. Seto-uchi (inside of the channels), which has been adopted in our later charts, is the correct name. I am reminded by the mention of the Inland Sea, that many of the names in our charts of it are either so badly spelt as to be unrecognizable when pronounced by a foreigner, or are altogether wrong. For instance, the large island off Bi-zen, called Shôdzu shima, is spelt Sozu, and Mutsure in the western entrance of Shimo-no-seki Straits, on which a lighthouse has been recently erected, is mis-called Rockuren. The town of Marugame in Sanuki is called Murakame in many of the charts published by the English Admiralty. It is no wonder, therefore, that native pilots are often accused of being ignorant of the name of places which it is their special business to know. The blame lies, not with the surveying officers who have prepared the charts, but with the native interpreters attached to them, who are often unable to read the names on Japanese maps. The mistake of Rockuren for Mutsure evidently arose in this manner. The native name for the Shimo-no-seki strait is Hayato no seto, for the Idzumi strait, Kada no seto, and for the Tsugaru strait, Mimmaya no oki, from a port of that name in Tsugaru.

The number of harbours and trading ports called *ô-minato*, or large harbours, by the Japanese, is fifty-six. A great many of these are no doubt inaccessible to European vessels of even moderate size.

Beginning with the Hok-kai-dô we find Matsumaye and Hakodate in Oshima. Across the Tsugaru straits lie Fukaura, Ajisawa, Mimmaya, Awomori, Sai and Okuto in Mutsu. Passing down the east coast we come to Miyako in Riku-chiu, Kesen, Ishi-no-maki, Sabusawa and Sendai in Riku-zen, Hiragata close to the boundary of [41] Iwaki and Hitachi, Naka-no-minato in Hitachi, Chôshi-ga-ura at the mouth of the Tone-gawa, Uchi-ura in Awa, Futsutsu, Kisaradzu, Giô-toku, Tôkiô, Yokohama

and Uraga in the Bay of Yedo, Ajiro, Shimoda and Kora in Idzu, Shimidzu in Suruga, Arai in Tôtômi, Kamezaki in Mikawa Bay, Ono and Miya in Owari, Toba and Matoya in Shima, both magnificent harbours, Sasara, Niye and Kowa in Ise, Nishiki, Kuki, Hayeda, Nikijima, Katsura, Uragami, Ôshima harbour, Nibu-no-fukuro, Tsuna-shirazu, Yura-no-uchi and Ôzaki in Ki-shiu, Kishi-no-wada and Ishidzu in Idzumi, Ôzaka, Amagasaki, Kôbe and Hiôgo in Settsu, Hino in Ban-shiu, Shimotsui in Bit-chiu, Tomo-no-tsu in Bin-go, Miyadzu, Sone, Murodzumi and Mitajiri in Suwô, Shimo-no-seki, Hinjiu, Senzaki or Setozaki, Hagi and Sui in Nagato, Hamada and Yunotsu in Iwami, Kidzuki, Uriu, Sagiura, Katsu, Kumotsu and Miwo-ga-seki in Idzumo, Moroiso and Kazumi in Tajima, Ine and Miyadzu in Tango, Obama in Wakasa, Tsuruga in Echi-zen, Miya-no-koshi in Kaga (a very bad port), Fukura, Wajima, Mawai and Nanao in Noto, Iwamachi, Niigata and Senami in Echi-go, Nezu-no-seki and Sakata in U-zen, Shiwokoshi, Yotsu, Honjô, Akita, Toga and Noshiu in U-go. Mitarai harbour, between two islands near Gei-shiu, is a favourite port of call for the junks which trade in the Inland Sea. In Awaji is situated the port of Yura. In Awa we find Tachiye, Hiwasa, Asagawa, Tomo-no-ura and Shishikui. In Tosa Murotsu, Urato, Nagahama, Inoshiri, Kure, Yotsu, Sagadzu, Misaki, Shimo Kawaguchi and Suwôgata. Mitsukuye and Nagahama in Iyo, and Takamatsu in Sanuki complete the list of ports in Shi-koku. Bun-go has Kushimi, Kumage, Nadate and Fukaye. Hiuga possesses only one port, that of Takanabe; Ôsumi likewise only one, namely, Ôdomari. Passing westwards we come to Kagoshima, Yamagawa, Ichiku and Kiôdomari in Satsuma, Hinaku in Higo, Sarashimi in Chiku-go, Moteki, Nagasaki, Nakatsu, Nagoya and Ayame in Hi-zen, Shijiki in Hirado, Fukuoka and Kane-ga-saki, in Chiku-zen.

Tsushima has a port called Take ura, Iki also one, Katsumoto, Sado one called Ogi. Besides these there are [42] numbers of smaller ports and harbours of refuge which can only be discovered by making an accurate survey of the coast.

An inspection of any native map shows that the greater proportion of the surface of the four main islands of which Japan is composed is covered with hills, which rise in many places to mountains of considerable height. The most extensive plains are those of the Kwan-tô, of Echi-

go and the north of Ô-shiu. The provinces of Mikawa, Mino and Owari also are very flat. Half-way between Yedo and Kiôto lies the table-land of Shinano, elevated at least 2,500 feet above the level of the sea, and surrounded and intersected by lofty ranges of mountains, of which those on the boundary of Hida are certainly the highest. From the eastern edge of this province there is a sudden drop of 1,800 feet on to the Yedo plain, while on the north the ground slopes gradually away down to the province of Echi-go. Another lofty range divides the former provinces of Mutsu and Dewa running from Aidzu directly north as far as Tsugaru. The province of Kai is almost surrounded by mountains, amongst which Yatsu-ga-take, or Eight Peaks, Koma-ga-take and Shirane are the most conspicuous.

The list of mountains which are considered the most worthy of notice by the Japanese naturally begins with Fuji-san, mispronounced Fusiyama by Europeans. Next come Gwas-san in Ü-zen, Ontake in Shinano, the Nikkô range in Shimotsuke, Ô-mine in Yamato, Haku-san in Kaga, Tateyama in Etchiu, Kirishima yama in Hiuga, Aso-san in Hi-go, Tsukuba san in Hitachi, Onsen-ga-take in Hi-zen, Asama yama in Shinano, Chô-kai-zan in Ü-go and Iwaki in Mutsu. There are several active volcanos in Japan, of which Asama yama and Aso-san are the best known to foreigners. It is a curious fact that the Japanese, nevertheless, possess no word for volcano.

Owing to the comparative narrowness of the main island of Japan and the small size of the other three, none of the numerous rivers are of great length. The longest [43] and widest is probably the Tone-gawa. The Shinano-gawa and Kiso-gawa, both of which take their rise in Shinano, come next. In addition to these may be mentioned the Ôi-gawa, Fuji kawa and Tenriu-gawa on the south, Sakata-gawa in Ü-zen, the Abukuma-gawa in Ô-shiu and the Ishikari in Yezo, or as we ought now to say, in the Hok-kai-dô. Almost every one of these rivers takes its name either from a province, a department, or a place on its course. Many Japanese rivers change their name several times between the source and the mouth. Thus the Baniu-gawa, which flows into the sea between Fujisawa and Odawara, is called the Kadzura-gawa from its source in the Yamanaka lake at the base of Fuji down to the town of Atsugi. The Yodo-gawa, at the mouth of which is situated the city of

Ôzaka, is called the Seta-gawa at the point where it leaves the lake of Ômi, and the Uji-gawa between the towns of Uji and Fushimi. Above Hashimoto it receives the waters of the Kidzu-gawa, absorbing its name as well, which re-appears below the city of Ôzaka. The Yodo-gawa disappears at Ôzaka, and the other mouths are called Nakatsu-gawa, Aji kawa and Shirinashi-gawa. The Sumida-gawa which flows through Yedo is called the Ara kawa near its source, and the Toda-gawa at the point where it intersects the Naka-sen-dô. What foreigners have been accustomed to call the Logo or Logos ever since the opening of Japan, is the Tama-gawa, and that part only which runs by Kawasaki is called Roku-gô, which has been corrupted into Logo. Not even those rivers whose reputation is most widely spread, such as the Tone-gawa and Kiso-gawa retain the same name throughout.

The Tone-gawa rises on Mon-ju-zan behind Fujiwara in the department of Tone in the province of Kôdzuke. From its source to Chôshi point, where it falls into the Pacific Ocean, it measures more than 70 *ri*, or 170 miles. It is nicknamed Ban-dô Ta-rô, which may be rendered 'the eldest son of the region west of the pass.' The first town of any importance on its banks is Numata, formerly the seat of a small *dai-miô*. A little way below this town the Agatsuma-gawa flows into it on the right. Just above the [44] town of Mayebashi, important as a silk producing centre, it throws off a network of streams, which reunite with it near the point where the Karasu-gawa falls in. After receiving the waters of the Watarase-gawa, which drains the S.E. part of Shimotsuke, it separates into two branches opposite the town of Kurihari on the Ô-shiu kai-dô. The southern branch is called the Gon-gen-dô-gawa, and passing by Sekiyado, becomes the Yedo-gawa, falling into the Yedo Bay at Horiye. The main stream is here called the Akahori-gawa. In passing Sekiyado it throws off a branch which usually falls into the Yedo-gawa, but during floods its current becomes reversed, thus earning for it the name of Sakasa-gawa, or 'upside down river.' After receiving the waters of the Kinu-gawa, whose source is at the boundary of Shimotsuke and Iwashiro, and the Kokai-gawa, which rises near Utsunomiya, besides the surplus water of numerous meres, such as the Aga numa, Imba numa and Naga numa in Shimôsa, and those of Ô-ura, Kasumi-ga-ura and Saka-ura in Hitachi, and attaining a breadth of 1,740 yards, or nearly

an English mile, it enters the sea at Chôshi. At Chôshi it narrows down considerably, and passes between some sharp rocks on the Shimôsa side and a long sandy spit which forms part of Hitachi. In stormy weather the bar is completely impassable, even for the strongly built native boats. This part of the coast has been fatal to at least four foreign vessels since the opening of the country to commerce, the last victim being the "Wanja," whose loss was reported about a fortnight ago.

The Shinano-gawa rises in the department of Saku in the south-east corner of Shinano. It flows in a north-westerly direction and then due north past the towns of Komuro, Uyeda and Matsushiro. During this part of its course it is called the Chikuma-gawa, probably after the department of that name, though it does not pass by it. A little below Matsushiro it is joined by the Sai-gawa, which rises on Koma-ga-take. After passing the town of Iiyama it enters the province of Echi-go, which it traverses in a north-easterly direction, and falls into the sea at Niigata.

[45] The Kiso-gawa likewise rises in Shin-shiu. It flows westward down the valley of Kiso, being joined by several small streams of no great importance. Entering Mino at Ochiai, it shortly afterwards unites with the Hida-gawa, which rises in the north of the province of Hida. At the point where it intersects the Naka-sen-dô it is called the Ôta-gawa, after a town on its right bank. From Inuyama it forms the boundary between Mino and Owari. Near this town, and at several points further on, it throws off branches which traverse Owari, and fall into the sea. On the right it is joined by the Sunomata-gawa, which drains the western part of Mino, and shortly before reaching its mouth near Kuwana splits into several branches.

The Tenriu-gawa flows out of the Lake of Suwa in Shinano, runs past the town of Iida almost parallel to the Kiso-gawa, and traversing the province of Tôtômi falls at last into the Tenriu nada. It has no tributaries of any importance.

The Ôi-gawa rises in the south-west of Kai[6] and traverses the

[6] According to most Japanese maps this statement would be correct, but it has recently been determined that the whole of the upper valley of this river belongs to Suruga.—E. S., Sept., 1882.

province of Tôtômi, intersecting the Tô-kai-dô between Kanaya and Shimada. It is more remarkable for the breadth of its bed, which near the mouth is 2½ miles wide, and for the swiftness of its current, than for the length of its course.

The Fuji kawa, called in the upper part of its course Fuyefuki-gawa, rises on Koku-shi Dake in the north of Kai, and receives several tributaries of varying volume. During the lower part of its course it traverses the centre of Suruga. It is famous for being one of the swiftest stream in all Japan.

The Sakata-gawa rises in the range of mountains which separates U-zen from Riku-zen, and flowing due west between the departments of Mogami and Akumi on the north and Murayama and Tagawa on the south, enters the Sea of Japan at Sakata.

The Abukuma-gawa rises near the town of Shirakawa in Iwaki, flows northwards close to the eastern boundary of Iwashiro, passing not far from the towns of Miharu, Nihommatsu, Fukushima and Shiraishi, traverses the upper end of Iwaki, and then, making a turn to the right, [46] becomes the boundary between that province and Riku-zen, falling at last into the Pacific Ocean near the town of Watari.

There are numerous lakes in Japan, some of which, such as those of Hakone, Suwa and Chiu-zen-ji near Nikkô, lie far above the level of the sea. Only one, the Biwa lake in Ômi, is worthy of notice on account of its size. It measures about 50 miles in length, or four miles more than the lake of Geneva, while its greatest breadth is about twenty miles or more than twice that of the lake of Geneva. At Katada, about ten miles from its southern end, it suddenly contracts to a breadth of one mile and a half, after which it expands again slightly.

The Inawashiro lake in Iwashiro, seven ri from which on the south side was formerly situated the castle of the Princes of Aidzu, is stated by natives of that part of the country not to exceed ten miles in length, it but certainly is drawn much larger on the maps. Out of it flows the Agano-gawa, which was formerly a tributary of the Shinano-gawa, but now falls into the sea some miles north of Niigata.

For a country in which the only vehicle used in travelling was until lately the palanquin, Japan possesses a very good system of high-roads.

Amongst these the Tô-kai-dô is best known to foreigners. Its existence probably dates from the time when the country was divided into circuits, though it has of course been much improved since it was first constructed. It is the only road in the country which is named after the circuit which it traverses. Whether it begins at the Nihom-bashi in Yedo and ends at the Sanjô-bashi in Kiôto or vice versâ is a point which would be difficult to determine. A great many writers have stated that all the roads in the Empire start from the Nihom-bashi, but this evidently cannot be true of roads on the west of Kiôto. The length of the Tô-kai-dô, according to an estimate lately prepared for the Japanese Post Office, is 125 *ri* 18 *chô*, or nearly 307 miles. The other road between the two capitals, called either Naka-sen-dô or Kiso kai-dô, which traverses half the Tô-san-dô [47] and the province of Musashi, is said to be 185 *ri*, 32 *chô*, or a little over 328 miles, in length. The longest highroad is the Ô-shiu kai-dô between Yedo and Awomori on the Tsugaru Straits. It traverses Musashi, Shimotsuke, Iwashiro, Riku-zen, Riku-chiu and Mutsu, and its length is given as 181 *ri*, 6 *chô*, or nearly 444 miles.

Two roads from Yedo to Niigata exist, the one by way of Takasaki in Jô-shiu, over the Mikuni pass into Echi-go, the other by Oiwake, Zen-kô-ji, Takata and Kashiwazaki. The former, which is said to be impassable in winter, measures 91 *ri* 29 *chô*, or about 225 miles, the latter 108 *ri* 17 *chô*, or about 264 miles. Neither possesses a name, and for a considerable distance each is identical with the Naka-sen-dô. Another road which possesses great interest for the traveller in search of mountain scenery is the Kô-shiu kai-dô. It unites Yedo and the town of Kô-fu, distant from each other 81 *ri* 14 *chô*, or 77 miles, and a continuation of it from Kô-fu joins the Naka-sen-dô at Shimo no Suwa, 18 *ri*, 6 *chô*, or about 32 miles further. The book of itineraries called *Go-kai Dô-chiu Sai-ken-ki* contains the itineraries of thirty-seven roads, all of which lie on the east of Kiôto. There are of course high-roads on the west of Kiôto, but they are of less importance because there is little traffic in the San-in-dô, and that of the San-yô-dô is conducted in junks which ply on the Inland Sea. I have heard Europeans call the road which passes through Kôbe westwards to Shimonoseki 'Tô-kai-dô,' but this is an error. It is not even called San-yô-dô after the circuit which it traverses.

In a work on general geography lately published by the Education Department (entitled *Yo-chi Shi-riaku*), the area of Japan is stated to be 24,780 square *ri*, or taking the linear *ri* as equal to 2.45 English miles, about 148,742 miles. This is about one-fourth more than the area of the United Kingdom, which contains 121,115 square miles. The Japanese estimate cannot be looked upon as exact, since it is founded on maps which are far from correct. The population is generally asserted to be about 80,000,000, the authority being a census made in 1804, which was [48] founded to a great extent on the reports furnished by the officers of the *dai-miôs*, and is therefore not accepted as authentic. It is doubtful whether Japan, is spite of her greater area, has as large a population as the British Isles.

The notion that *miyako*, which means Imperial Capital, is the name of the old metropolis, has by this time been exploded. The real name of the city was Kiôto, until the year 1869, when it was changed to Sai-kiô, or 'western capital,' in order to distinguish it from Tôkiô, the new name given to Yedo. Tôkei is merely another pronunciation of Tôkiô, but it is certainly to be wished that the Japanese would adhere to one of the two, to the complete exclusion of the other. The population of Tôkiô is variously stated, but is probably not much over 800,000. Saikiô had about 370,000 inhabitants in 1870. Next in importance after these two cities comes Ôzaka with a population of 414,000 souls. Foreigners generally both spell and pronounce the name of this city wrongly. Nagoya, the capital of Owari, is next in size, followed closely by Hiroshima in Gei-shiu, Saga in Hi-zen, Kagoshima in Satsuma, Kanazawa in Kaga, the double town of Hakata and Fukuoka in Chiku-zen, and Himeji in Ban-shiu. Most of these towns are said to have over 100,000 inhabitants. Kumamoto in Higo, Kurume in Chiku-go, Fukui in Echi-zen and Gifu in Mino rank in the second class, but I am unable to say what is the population of each. Of the ports open to foreign trade, Ôzaka being excluded, Nagasaki is said to have the largest population, but Yokohama bids fair to surpass it before long. Hakodate and Niigata have, I believe, about 30,000 inhabitants each.

The work on Geography to which I alluded at the commencement of this paper contains numerous other errors besides that of supposing

Nippon to be the name of the main island of the group. Considering that the country had been open to foreign trade for at least eleven years when the edition from which I quote was published, it is a little strange that the author should not know better than to assert that there are few domestic animals in Japan. Cows, horses, dogs, cats and poultry [49] may certainly be included in this category, and the experience of every one who has resided here even for a short time must have convinced him that all these species of domestic animals abound. Another statement is that the country is deficient in timber, which may perhaps be correct of the neighbourhood of Nagasaki, but certainly does not apply to the rest of Japan. The facts that all the houses are constructed of wood, and that the maritime inhabitants possess countless junks and fishing-boats are a sufficient contradiction.

It is also incorrect to state that "the imports, mainly cotton and woollen goods, are paid for largely in copper, in bars."

Hakodate is spelt Ho-Kodadi. Japan is far enough from London to excuse the author for being ignorant of the fact that the Tycoon is no longer Emperor of Japan, but even supposing the news of the Mikado's restoration to have taken two years to reach England, that is no reason for calling the Tycoon a Kouba, and stating that he was assisted by a council of the great feudal princes.

The word *Ku-bô*, which the common people applied to the Tycoon, was no official title. The opinion of one or two of the great *dai-miôs* may now and then have been asked for or offered, but no such institution as a council composed of the eighteen *Koku-shi dai-miôs* existed at any time.

The great earthquake at Yedo, which is said by Dr. Cornwell to have occurred in 1860, took place five years earlier, and the number of persons who lost their lives on that occasion, which is stated by him at 200,000, is certainly immensely exaggerated. Even the Japanese, who have a passion for large figures, allow that not more than 10,000 were killed.

In order to give his readers a general idea of the manners and customs of the people, the author states: "One of their amusements, which they share with the Chinese, is strange to us—that of flying immense kites; not by the boys, who only look on and admire, but by

the men." Certainly, if the men do now and then indulge in this pastime, the little boys cannot be said to abstain from it. [50] Any one can convince himself of their ardent devotion to the sport by taking a walk through Yedo in the month of January. Yedo is called 'a handsome city of park-like appearance, with a population of 1,500,000 inhabitants.' Yedo can never have corresponded to such a description, even in its most flourishing days, and there is no reason to suppose that its population ever exceeded a million or twelve hundred thousand at the outside. A "colossal idol" is spoken of as still existing at 'Miyako,' by which the great bronze Buddha coined into 'cash' in the 17th century is evidently intended.

The rectification of these misstatements does not properly come within the scope of my paper, in which I profess to speak only of the physical geography of Japan, but so much that is erroneous has been written about this country that no opportunity should be lost of correcting mistakes or inaccuracies of whatever kind, even when they appear in a mere school book. A great deal has yet to be done to complete our knowledge of these islands, which is at present limited to the information which we can gain from native books and maps, from our own incomplete surveys of the coast, and from the notes of the few travellers who have passed along the high-roads of the interior.

The authorities for the statements in this paper are the following books:—

Yo-chi Shi-riaku.—Epitome of Universal Geography.

Sho-koku Mei-gi kô.—Derivations of the Names of the Provinces.

Koku-gun Kun-gi.—Meanings of the (names) of Provinces and Departments.

Kô-chô En-kaku Dzu-kai.—Historical Atlas of Japan.

Kiso Mei-sho Dzu-ye.—Guide to the Naka-sen-dô.

Tone-gawa Dzu-shi.—History of the Tone gawa.

Chiu-zan Den-shin-roku.—Account of Loochoo.

Zô-ho Ni-hon Shiwoji no Ki.—Japan Pilot. And the following maps:—

[51] *Jis-soku Ni-hon Chi-dzu.*—Map of Japan in four sheets.

Fujimi Jiu-san Shiu Yo-chi no Zen-dzu.—Map of thirteen Provinces from which Fuji can be seen.

Koku-gun Zen-dzu.—Atlas of Japan in two volumes.

Dai Ni-hon Yo-chi Zen-dzu.—Map of Japan in one large sheet.

Hok-kai-dô Koku-gun-dzu.—Map of the Hok-kai-dô, published by authority of the Kai-taku-shi.

Keith Johnston's Royal Atlas.

Dai Ni-hon Kai-ro-dzu.—2 Vols. Charts of the Japan seas.

Dai Ni-hon Chiu-kai Dzu-shi.—Charts of the Japanese seas in 5 Volumes.

THE TYPHOONS OF SEPTEMBER AND OCTOBER, 1872.

By Lieut.-Commander Nelson, U. S. War-ship "Idaho."

[*Read before the Asiatic Society of Japan, on the 10th May, 1873.*]

[52] Nearly two centuries ago there were accounts published of ships having scudded (run before the wind) in a hurricane for a day or two, and yet found themselves very nearly in the place from which they started when the gale commenced; and of others which in lying to, had the wind veering rapidly and sometimes shifting suddenly to an opposite point of the compass, the shift most generally preceded by a calm, but not always so; and again of other ships which, though not far distant from each other, had the winds blowing furiously in opposite directions and veering differently.

Yet no one appears to have attempted to solve this, at that time, strange problem or to account in any way for the singular phenomenon (that used to puzzle the understanding of the hardy old tars who having passed successfully through one of these storms escaped with their lives to tell the tale of their experience) until nearly one-third of the present century had passed away.

I would not be understood to say that no one had ever given any attention to the subject—for I purpose to cite authorities by whom these storms had been noticed and pronounced to be great whirlwinds—but I mean to assert that no one had ever attempted to solve the problem by [53] pursuing their investigations, and generalizing observed facts in order to clear up the mystery and discover the laws by which these storms are governed up to the time I have mentioned.

In the year 1698 Captain Langford in a paper on the West Indian

Hurricanes (Philosophical Transactions for 1698) describes the veering of the wind and calls it a whirlwind, speaks of a progressive motion and gives it some limits but nothing more.

In the year 1748 a Spanish navigator Don Juan De Ulloa, describes a storm on the Pacific coast of South America, in which description he speaks of the veering and sudden shifting of the wind, but does not seem to have conceived the idea of a whirlwind or rotatory storm.

Colonel Capper—in speaking of the Madras and Coromandel coast hurricanes—says, in a work published in 1801, after describing these storms:—"All these circumstances properly considered clearly manifest the nature of these winds, or rather positively prove them to be whirlwinds whose diameter cannot be more than 120 miles, and the vortex seems generally near Madras or Pulicat;" and again, after describing some on the Malabar coast, and in the Southern Indian Ocean, he says:—"Thus then it appears that these tempests or hurricanes are tornadoes or local whirlwinds, and are felt with at least equal violence on the coast and some little distance out at sea."

A French author named Romme, in a work published in 1806, describes a storm in the China sea near the Gulf of Tonkin, which he distinctly calls a whirlwind, and applies the same name to other storms experienced in the Mozambique channel, and again others in the Gulf of Mexico.

Professor Farrar of the Cambridge University, New England, in describing a storm that passed over Boston in 1815, says that he could not determine the centre or limits, but noticed the veering of the wind and the fact of it having veered in opposite directions at Boston and New York at the same time. Also the difference of time between [54] the greatest violence of the storm in the two places.

But it is not my purpose here to cite all the cases on record of gales that have attracted the attention of scientific men. Enough has been said to show that such men did notice the peculiar character of these storms, and to some extent explained it by deciding that they were great whirlwinds. None of them, however, followed up the clue thus found, or attempted to unlock the secret of the Law, to which this was evidently the key until the year 1831, when Mr. William Redfield, an American Philosopher and Naval Architect, came out in a paper pub-

lished in the American Journal of Science, and clearly demonstrated that the storms on the American coast were not only rotatory storms or blowing in circles around a common centre, but also that they had a progressive motion and were traceable moving on a curved track, from the West Indies and along the coast of the United States, curving off to the Eastward near the banks of Newfoundland. At the same time he published some excellent rules for avoiding the centre, and the chances of damage to ships caught in these gales at sea, showing also how the barometer might be made a valuable guide if carefully watched and properly attended to.

While Mr. Redfield was employed collecting the information upon which he based his theory of the law of storms, a similar investigation was going on in Germany.

A number of gales had attracted the attention of German Meteorologists chiefly on account of the oscillations and great fall of the barometer before and during these gales; and a Mr. Brande who had kept an accurate register of observations for a length of time, and obtained the registers in various places at the same time, eventually advanced a theory that the wind, during these great storms, blew from all points of the compass in straight lines towards a central space where the barometer was for the time at its lowest stand.

The theory of Mr. Brande was disputed by Professor Dove of Berlin, who subjected the observations to a new examination, and made it appear that an explanation of all [55] the phenomena was afforded by the assumption of one or more circular currents, or whirlwinds of great diameters, advancing from South-west to the North-east.

The theory of Professor Dove, although under discussion about the same time when Mr. Redfield by an independent course of investigation arrived at the results above mentioned, was not known in the United States when the latter gentleman published his paper in the American Journal of Science, a fact indicated strongly in the language of Sir David Brewster when he said: "The theory of rotatory storms was first suggested by Colonel Capper, but we must claim for Mr. Redfield the greater honour of having fully investigated the subject, and apparently established the theory upon an impregnable basis."

In the year 1888, Lieutenant-Colonel Reid of the Royal En-

gineers published a valuable work entitled "Reid on the Law of Storms," in which he agreed in all particulars with the views of Redfield, and verified by personal observation all his theory; adding many substantial proofs to the same by investigations of West Indian hurricanes, and of some in the Southern Indian Ocean. Colonel Reid by his observation of storms in the Southern Indian Ocean, further proved Mr. Redfield's theory that the storms in the Southern Hemisphere revolve in a contrary direction to those in the Northern Hemisphere. Colonel Reid may be said to have reduced the science to practical use by showing how safe rules for scudding, or lying-to in a hurricane, might be deduced from the theory, and how when obliged to lie-to, ships should do so on the proper tack according to the side of the path they are on; and lastly, how these storms may be made profitable to ships bound in the direction of their track, by sailing carefully on the outer circumference with a fair wind, being all the time in a safe position to heave-to and let the storm pass.

Thus, by the publication of Col. Reid's "Law of Storms" the science was reduced from a mere speculative theory to a practical law, the value of which can be fully appreciated only by the mariner when caught in one of these gales at sea.

[56] That which had been discovered by Mr. Redfield and verified by a great number of observations by Col. Reid has been termed the Law of Storms, and is briefly explained as follows:—If by reference to the Diagram we suppose the short curved arrows to represent the direction of the wind, and the long dotted arrow to indicate the track or course on which the gale is moving bodily forward, we shall have before us the Law of Storms in the Northern Hemisphere; and by reversing the whole, that is turning the points of the arrows in the opposite direction, the diagram will represent the Law of Storms in the Southern Hemisphere.

Mr. Peddington says, in speaking on this subject. The words "Law of Storms" then, signifies first:—that it has now been proved by the examination and careful analysis of perhaps more than two thousand logs and of some hundreds of storms by the authors already referred to (Redfield, Reid, Dove, and others) and by many other observers in periodical publications, as well as some whose results have

not yet been published, that the wind in hurricanes, and frequently in severe storms in the higher latitudes on both sides of the Equator, has two motions. It turns or blows round a focus or centre in a more or less circular form, and at the same time has a straight or curved motion forward, so that, like a great whirlwind, it is both turning round and, as it were, rolling forward at the same time.

Next it is proved that it turns, when it occurs on the north side of the Equator, from the east or the right hand by the north towards the west, or against the hands of a watch (as represented by this diagram), and in the southern Hemisphere that its motion is the other way or with the hands of a watch;—being thus as expressed by Professor Dove of Berlin, south, east, north, west, for the Northern Hemisphere; and north, east, south, west for the Southern Hemisphere.

These two principal laws (turning round a centre and moving forward) constitute the rule or law of storms, and it has been abundantly demonstrated to hold good for [57] several parts of the world; but as we do not have positive evidence from all parts of the world, it is assumed that this law is true everywhere, and this assumption is based upon the strongest grounds, viz:—the great analogy usually existing in the laws of nature, and the fact that every new investigation affords fresh proofs of the truth of the law in both hemispheres.

Having thus established the law of motion of the winds in a typhoon, we have only to consider whether we are north or south of the equator in order to locate the centre; if north we know that the winds rotate from right to left, contrary to the watch hands, or from S. to E. by N. to W., and also that the N. compass point is the E. typhoon point, that is the wind blows East.

The W. compass point is the N. typhoon point, the S. compass point is the W. typhoon point, and the E. compass point is the S. typhoon point; hence, to locate the centre as to bearing or direction, stand in the middle of a compass (or imagine such a thing) and look towards the typhoon point or in the wind's eye, and the centre will be on the right hand, and to prove this strike off a small circle and let the circumference represent the wind circle in a typhoon; then draw a straight line through the centre of the circle so as to cut the wind-circle, and it will do so at right angles. Draw another line through

the centre, at right angles to the first, and it will be found at a point 90 degrees to the left of the first line or where the second line cuts the wind-circle. The direction of the wind will be parallel to the first line; hence, standing at this point and looking in the direction of the wind's eye, and parallel to the first line, the centre will be 90 degrees to the right, or on the right hand.

As a practical example I will take the typhoon which passed over Yokohama on August 25th, 1872, and which this diagram is intended to represent. The wind in the commencement of this gale was E. S. E., and according to the above rule of looking into the wind's eye and having the centre on the right hand, in this case it ought to bear S. S. W., and this was exactly the case as shown by [58] this diagram, the *Idaho* at her anchorage in the harbour being marked on the N. N. E. part of the circle.

As most of you here present were in Yokohama at the time when this typhoon passed over the place, it will not be necessary to dwell long on the details of it, especially as there was nothing very remarkable about it. I will merely mention such of the principal facts as may be of interest to those of you who had no opportunity of observing them for yourselves.

Thus: at 4 p.m. the gale commenced with the wind at E. S. E., blowing with a force of from 6 to 9; barometer 29.28; thermometer 80; weather, o. c. q. r. u.; clouds, *cumulus-nimbus;* sea, m.

At 5 p.m., wind E. S. E., force from 9 to 10; barom. 29.14, having fallen 0.14 inch during the hour; therm. weather and clouds the same; sea c. r. At 6 p.m. E. S. E. ½ E., force 9 to 11; barom. 28.94, having fallen 0.20 during the hour; therm. 78, at 7 p.m. E. S. E. ½ E., force 11½. This was a fearful blast which lasted about five minutes; had it continued for any length of time great damage both on shore and in the bay would have been the inevitable results. Even during the short time it did last two vessels were started from their anchorage and driven rapidly before the fury of the blast. One, a small steamer, which in her course fouled a native junk and sunk her; the other, a British barque, drifting at the rate of about five or six knots in a W. N. W. direction towards the Kanagawa shore, where she would surely have brought up had the wind continued for half an hour, or

even 20 minutes longer. Barom. at 7 p.m. 28.50, having fallen 0.44 inch during the hour. At 7.05, however, the blast was over and the wind began to veer to the southward.

At 7.15, barometer 28.35, having fallen 0.15 inch in 15 minutes, wind S. very light, the rain and squalls had ceased and an entire calm followed. At 7.30 barometer had reached its lowest stand, 28.27, having fallen 0.08 inch during the 15 minutes, and at that time I compute the centre to have passed over the *Idaho;* the calm lasted for nearly half an hour. At 7.45 light airs were felt from [59] N. W., and at 8.00 the shift came, in force from 7 to 9 from W. N. W. ½ W., with a re-appearance of heavy rain and violent squalls; the barometer had risen to 28.32. At 9 P.M. the wind was W. by N., barometer 28.70, showing a rise of 0.38 inch during the hour; the wind blew with a force of from ■ to 10. At 10 the wind was nearly W., force from 4 to 6; barom. 28.98, showing a rise of 0.28 during the hour; the rain at this time ceased. At 10.15 the blue sky appeared; and at 11 P.M. the typhoon had entirely passed away, and the barometer had risen to 28.99.

This diagram shows the centre to have passed over this place, and this is made evident (in accordance with the law) by the wind remaining nearly stationary during the first half of the gale, a thing which can only occur when the centre is travelling directly towards you, or when running on a course parallel to the course of the "Typhoon"—keeping the bearing of the centre the same as with the bearing of the centre, the wind must always change.

Take for an example this typhoon travelling N.E. instead of N.N.E., or at an angle 22½° to the first line of bearing of the centre as observed at the beginning of the typhoon—the centre in that case would not have passed over Yokohama but about 20 miles to the eastward, and the winds would have changed as follows: commencing at 4 p.m. E.S.E.—as it was—at 5 wind would have been E. by S., at 6 E.N.E., at 7 N.N.E. nearly, at 8 N. by W. ½ W., and at 9 p.m. N.N.W. ½ W., at which time the storm-circle would have left us, and we should have passed through the chord of an arc equal to 135° of the storm circle, and the length of that chord would have been equal to about 98 miles. I have computed the diameter of this typhoon to be 105 miles, the whole

diameter requiring seven hours to pass a given point, travelling at the rate of 15 miles an hour. The diameter and rate of travelling is arrived at by knowing the time occupied in passing over a space of 15 miles from a point in the vicinity of Cape Kamisaki to the *Idaho's* anchorage in this harbour.

[60] The general course of this typhoon was N.N.E., curving more to the eastward after passing here.

The greatest fall of the Barometer in one hour was 0.44 inch, and the total fall was 1.01 inches.

I will now briefly state a few of the theories afloat regarding the origin or cause of Circular Storms (Typhoons). Although none of the scientific men who advance these theories pretend to say that they are correct—or even approximately so—there is nothing positive known about the origin or cause of typhoons, and the theories at best are only probable ones. Thus Mr. Redfield seems to think they are produced by the conflicts of prevailing currents in different strata of the atmosphere, giving rise to circular movements, which increase and dilate to storms.

Colonel Reid thinks there may be some connection between electricity, magnetism and these storms.

Mr. Espy, an American Philosopher, has published a work (entitled "Philosophy of Storms") in which he gives one of the causes of storms as follows:—Upon any partial heating of the air at the surface of the earth, it rises in columns more or less charged with vapor, condensed into clouds or rain. Next, in this changing of state the vapor communicates its latent caloric to the surrounding air, which also expands, is cooled itself by that expansion, but also gives heat to that part of the air in which it then is, and becoming lighter, is carried farther up. So that which Mr. Espy calls an upmoving column is always thus formed before rain is produced, and the air rushing in to supply the partial vacuum at the base of this chimney-like column forms thus the centripetal streams of air which he affirms is the true motion of the wind in all storms, and especially in typhoons; and according to his theory the winds do not blow in circles, but are straight lined and blowing from the circumference of a circular storm disc towards the centre, rushing up an immense moving chimney of any longitudinal shape, the draught of which is occasioned by an extensive condensation of vapor above.

He accounts for the production of clouds, the rise and [61] fall of the Barometer by this cause, inferring, that at a certain height the rising air overflows the rest of the atmosphere, forming a ring of cloud vapor and air, which pressing on that below, occasions the rise of the barometer found at the edges of severe storms.

Mr. Thomas Hopkins of Manchester, in a work published in 1844, entitled "On the atmospheric changes which produce Rain, Wind and Storms," admits with Mr. Espy the ascent and condensation of vapor in the air from various causes, and that all horizontal winds are thus produced. He considers also that the ascending winds produce descending ones, and that the rain produced in the higher regions brings air and vapor with it in its descent, and thus constitutes the lower atmospheric currents; and finally, that storms are produced by the same causes that produce other winds, and that the greatest storms are descending winds.

Dr. Alex. Thom, of H. M. 86th Regiment, in his book upon "Storms in the Indian Ocean, and South of the Equator," is of opinion that the cause of the rotatory motion in storms—is, at first, opposing currents of air on the borders of the monsoons and trade-winds, which differ widely in temperature, humidity, specific gravity, and electricity. These, he thinks, give rise to a revolving action which originates the storm, which subsequently acquires an intestine and specific action involving the neighboring currents of the atmosphere, and enabling the storm to advance through the trade-winds to its opposite limits.

He further inclines to believe that "as the external motion is imparted to the interior motion of the mass, and centrifugal motion begins to withdraw the air from the centre and form an up-current, the whole will soon be involved in the same vortical action." The up-current he accounts for by the pressure being removed from the centre, when the air there increases in bulk, diminishes in specific gravity, and hence its upward tendency.

There is, however, another point of view in which some writers have considered [62] the formation and continuance of these storms. They suppose, with Dr. Thom, that the storms are formed by opposite currents of air, producing whirlpools as in water, but do not consider with him, that they are produced at the edges of the streams, as we see in water whirlpools. These writers incline to the belief that the whirls

originate between the upper and lower surfaces of strata of air of different temperatures, degrees of moisture, etc., and moving in different directions.

These whirls, they suppose, first formed above, and then descend to the surface of the earth; just as we see a water spout begin at sea, with a slight swelling of the lower part of a cloud, and then a gradual descent of it. In short, they look upon typhoons as wind-spouts.

The views of Sir John Herschel on the causes of typhoons may be briefly stated, as follows:—

It seems worth inquiry, he says, whether hurricanes in tropical climates may not arise from portions of the upper currents prematurely diverted downwards before their relative velocity has been sufficiently reduced by friction on, and gradually mixing with, the lower strata, and so dashing upon the earth with that tremendous velocity which gives them their destructive character, and of which hardly any rational account has yet been given. Their course, generally speaking, is in opposition to the regular trade-wind, as it ought to be in conformity with this idea.

He then goes on to say—but it by no means follows that this must always be the case: In general, a rapid transfer, either way in latitude, of any mass of air which local or temporary causes might carry above the immediate reach of the friction of the earth's surface would give a fearful exaggeration to its velocity. Wherever such a mass should strike the earth a hurricane might arise; and should two such masses meet in mid-air, a tornado of any degree of intensity on record might easily result from their combination.

Sir John Herschel further suggests that two great atmospheric undulations (which he terms barometric waves, because they are made evident by the fluctuations of the barometer) travelling in opposite directions and intersecting [63] each other, from their opposing forces might cause the phenomena of hurricanes or rotary storms.

Mr. Peddington says, in his valuable work on storms, entitled the "Sailor's Hornbook," page 22, par. 38, with reference to the cause or origin of typhoons:—"My own views are that cyclones [cyclone is the word which Mr. Peddington adopted to express the idea of a circular storm, and which is now generally accepted and used by nautical people]

are purely electric phenomena, formed in the higher regions of the atmosphere, and descending in a flattened dish-like shape to the surface of the ocean, where they progress more or less rapidly." "I think that the whirling tornadoes, spouts, and dust-storms, are certainly connected with them; *i.e.*, that they are the same meteor in a concentrated form, but we cannot at present say where the law which regulates the motions of the larger kind, ceases to be an invariable one."

Some writers advance the idea that volcanoes—and even large fires—originate violent circular motions of the atmosphere; and that volcanic eruptions are often accompanied by violent storms and heavy falls of rain there is no doubt. Mr. Peddington says: "There is much to countenance the idea that cyclones in some parts of the world may originate at great volcanic centres," and he is inclined to believe that their tracks are partly over the great internal chasms of our globe by which perhaps the volcanic centres and bands communicate with each other. He then goes on to say:—"If we produce at both ends the line of the track of the great Cuba cyclone in 1844, we shall find that it extends from the great and highly active volcano of Cosseguina, on the Pacific shore of Central America, to Hecla in Iceland." In 1821 the breaking out of the great volcano of Eyafjeld Yokul in Iceland, which had been quiet since 1612, was followed all over Europe by dreadful storms of wind, hail, and rain. In Iceland the barometer fell from the day before the eruption and for several days after.

A well authenticated fact was published in the English newspapers in 1852, of an extraordinary marine convulsion [64] experienced by the British ship *Mary*, on her passage from Liverpool to Caldera, being 12 miles north of the equator, in long. 19° W. A rumbling noise was heard to issue from the Ocean, which gradually increased until the uproar became deafening. The sea rose in mountainous waves; the wind blew from all points of the compass; the control over the ship was lost, and she pitched frightfully, all on board expecting every moment to be their last. This continued 15 minutes; the water then gradually subsided, when several vessels, in sight at the commencement of the convulsion, were found to have disappeared. It is noteworthy that the phenomenon occurred in October, 1851, one of the hurricane months in the West Indies.

Typhoons seldom appear without giving notice of their approach, and some indications may almost be relied on as being sure messengers of warning. Among the principal of these is the barometer. Not unfrequently upon the approach of a typhoon, the barometer seems restless and the mercury keeps oscillating in the tube:—often, when on the borders of a typhoon, the barometer rises suddenly one or two tenths; and Col. Reid gives an instance where two barometers on board the same ship rose half an inch above their usual level. If these indications by the barometer should be accompanied by a long, heavy swell, unaccounted for in any other way; an unusual appearance of the sky, steel-grey or with a greenish tint; blood-red, or bright yellow sunset: and, added to these, the appearance of peculiar or unusual forms or motions of the clouds, or a threatening appearance of the weather, I should have no hesitation in asserting that a typhoon was in the vicinity, approaching or passing; but either one of these things—taken separately—ought not to be disregarded, and the careful seaman will always be on his guard should any of these things appear to warn him of approaching danger. Mr. Peddington relates the case of the *Earl of Hardwick*, Captain Neller, as follows:—

"In the Southern Indian Ocean, when near the borders of a typhoon, she was standing off and on to keep out of [65] it; and describes the weather as being squally, thick, heavy and wild looking; the upper clouds coming from N. W.; the next stratum N. E.; and the lower scud, with the wind, fast from S. E. The trades (S.E.) were blowing strong—but at midnight ran into a deal calm; the breeze soon sprung up again, and the next day had a high, confused sea, barometer rising from 29.95 to 30.00. For two days after, the barometer kept falling gradually, squally weather, but strong trades. On the third day, barometer had fallen to 29.71, ship hove to; the appearance of the weather was threatening; dense lurid atmosphere; very peculiar appearance at sunset, last two evenings. Dark and threatening appearance to the N. Wd.; the wind increasing and drawing to the E'd., with thick weather when standing to the N'd., but always fine when going S. A thick, lurid appearance over the heavens—the sun only showing as through a dense veil, with heavy leaden-looking clouds to the N. and N. W." He further states: "The weather became more squally, with

rain, when standing N.—and that one heavy squall from N. E. was followed by light airs from the E'd. In some of the squalls the clouds were so dense and dark that it was not possible to see further than fifty yards from the ship." He also speaks of immense masses of leaden-colored clouds, covering the whole canopy of heaven, and giving it a murky, threatening appearance, and the sun setting, casting over the whole a red, lurid appearance, and throwing over everything on board the ship a reddish tint.

I have selected this case as a good example of what the indications of typhoons are, and although all typhoons are not as well marked as this one, yet one or more of these signs will generally appear in advance of the gale, and, separately or collectively, should receive a proper degree of consideration, as much of the safety of the ship and crew depends upon timely measures being taken for avoiding the gale, or if that be not possible, at least the dangerous part of it. In connection with the signs of approaching gales, I would mention that several cases are recorded wherein have appeared peculiar red tints, or lights in the [66] heavens, described as—"Flaming clouds on the horizon from whence proceeds the fiery tempest"; "appearing like entire conflagrations of the air and seas." And on other occasions "appearing as borders round the edges of remarkably dense and dark clouds, reflecting an awful redness upon the sails and ship."

A number of similar cases are recorded, which show that this red light and sky is not an uncommon phenomenon, or precursor, of typhoons.

Nearly all writers agree that a typhoon is a circular storm-disc, varying from one to ten miles in height, and in diameter from fifty to one thousand miles; and that the winds within the disc blow in circles—or nearly so—round a common centre, which is generally calm, and varying in size from one-tenth to one-fifth, and in some cases as much as one-fourth, of the whole diameter of the gale.

Writers, as we have seen, differ as to the place of formation, or commencement, of these gales, some asserting with Dr. Alexander Thom that they are formed on the borders of the trade winds and monsoons; and others, with Messrs. Redfield and Peddington that their motion is caused by opposing currents meeting in mid-air, and differing in temperature, humidity, electricity, etc., etc.

Col. Reid suggests that electricity and magnetism have something to do with the formation and continuance of these gales; and Mr. Peddington says they are, in his opinion, purely electrical phenomena.

Now, if we consider the theory of the mid-air formation of circular gales, and imagine two currents of air of different temperatures and degrees of moisture, and charged respectively with positive and negative electric fluids (the well known properties of which are to attract each other) travelling in opposite directions, it is probable that the meeting of these unequal and opposite forces, in the act of seeking or establishing an equilibrium, may have a rotatory motion imparted to them; the first particles in meeting having become neutralized and formed a focus round which remaining currents commence to move with great rapidity, and so impart their motion to the [67] surrounding atmosphere, which, in its turn, performs the same duty, and soon a large portion of the atmosphere becomes involved in the same vorticular action. An extensive condensation of vapor going on in the centre, the air becomes lighter there than elsewhere in the revolving disc, and forms a kind of chimney for the denser air below to pass up through; and when this process has been going on for some time, the air beneath is sufficiently exhausted to admit of the storm disc descending to the surface of the earth, after réaching which, it takes up a progressive motion and is impelled by magnetic attraction towards the magnetic poles.

A seeming contradiction to this statement may be found in the *Argyleshire's* typhoon, which I have here represented as travelling W. by S., and in a direction nearly parallel to the Magnetic Equator; but when it is remembered that some portions of the earth are heavily charged with magnetism (as is shown by the variation of the mariner's compass to the extent of two points or more of deviation from the true Meridian, and especially in the Danish Sound and Baltic Sea, where the local magnetic forces in the adjoining countries—especially Sweden, where iron is found in great quantities—is so great as to attract the compass very much more) it may be quite possible that similar attractions exist in China, or on the island of Hainan, which is called by the Chinese "the Mother of Typhoons."

I am aware, while supporting Col. Reid's theory of magnetism in typhoons, that opinions and theories have been published in opposi-

tion to it; but none have proved it to be wrong, or have accounted more clearly for the progressive motion of circular gales; and as all theories as yet made known with regard to the origin and cause of circular gales are but speculative in their character, I see no reason why the theory of magnetism in connection with typhoons should not receive a fair share of consideration, and as far as I am personally concerned, I give it the preference.

Some writers are of opinion that there is a close [68] connection between whirlwinds, dust-storms, and circular gales, and go so far as to say that whirlwinds and dust-storms are but miniature typhoons.

I will cite a few cases of this kind which (if electricity be considered one of the agents in the production of circular gales) certainly proves to some extent that the idea is not altogether unfounded.

I quote from Mr. Peddington's work, page 303, where will be found the following report by Dr. H. P. Baddeley, H. E. I. C. S., dated from Lahore, showing by experiments that the dust-storms are purely electrical.

"My observations on this subject have extended as far back as the hot weather of 1847 [this was written in 1850 in the *Philosophical Magazine* for August] when I first came to Lahore; and the result is as follows:—Dust-storms are caused by spiral columns of the electric fluid passing from the atmosphere to the earth. They have an onward motion and a revolving motion, like revolving storms at sea, and a peculiar spiral motion from above downwards like a corkscrew. It seems probable that in an extensive dust-storm there are many of these columns moving on together in the same direction; and during the continuance of the storm many sudden gusts take place at intervals, during which the electric tension is at its maximum.

"These storms hereabouts mostly commence from the N. W. or W., and in the course of an hour—more or less—they have nearly completed the circle, and have passed onwards.

"Precisely the same phenomena, in kind, are observable in all cases of dust-storms; from the one of a few feet in diameter, to those that extend for fifty miles and upward, the phenomena are identical.

"It is a curious fact that some of the smaller dust-storms—occasionally seen in extensive and arid plains, both in this country and in Affghanistan above the Bolan Pass, called in familiar language

'Devils,'—are stationary for a long time, that is upwards of an hour, or nearly so, and during the whole of this time the dust and minute [69] bodies on the ground are kept whirling about in the air.

"In other cases these small dust-storms are seen slowly advancing, and when numerous, usually proceed in the same direction.

"Birds—kites and vultures—are often seen soaring high up, just above these spouts, apparently following the direction of the column, as if enjoying it.

"My idea is that the phenomena connected with dust-storms are identical with those present in waterspouts and white squalls at sea and revolving storms and tornadoes of all kinds; and that they originate from the same cause, viz.—moving columns of electricity.

"In 1847, at Lahore, being desirous of ascertaining the nature of the dust-storms, I projected into the air an insulated copper wire on a bamboo on the top of my house, and brought the wire into my room, and connected it with a gold-leaf electrometer and a detached wire communicating with the earth. A day or two after, during the passage of a small dust-storm, I had the pleasure of observing the electric fluid passing in vivid sparks from one wire to the other, and of course strongly affecting the electrometer. The thing was now explained, and since this, I have, by the same means, observed at least sixty dust-storms of various sizes all presenting the same phenomena in kind."

He continues to describe the dust-storm as follows:—"Some of them come on with great rapidity, as if at the rate of forty to sixty miles an hour. They occur at all hours, oftentimes near sunset.

"The sky is clear and not a breath moving: presently a low bank of clouds is seen in the horizon, which you are surprised you did not observe before; a few seconds have passed, and the cloud has half filled the hemisphere, and there is no time to lose—it is a dust-storm—and helter-skelter every one rushes to get into the house to escape being caught in it.

"The electric fluid continues to stream down the wire unremittingly during the continuance of the storm, the sparks oftentimes upwards of an inch in length, and [70] emitting a crackling sound; its intensity varying with the force of the storm, and as before said, more intense during the gusts."

The dust-storms or whirlwinds when transferred to the ocean

would become whirlwinds and waterspouts,—being precisely the same phenomena—and a number of cases are recorded where they have been met with on the borders of typhoons, and of ships having performed various manœuvres to get clear of them.

On the subject of typhoons, a late writer asserts that the true theory of commencement or formation of cyclones in the Atlantic is "the intrusion of the S. E. trade-winds into the area of the N. E. trade-winds; and he tells us that this satisfies all the conditions of the cyclone problem, and is, therefore, the true solution of the *origin* of cyclones."

I fail, however, to see that by this he accounts in any way for the progressive motion; and therefore see no reason to change my ideas with regard to the presence and influence of magnetism in the gales.

A few remarks on the barometer may be desirable in connection with this subject; and I will endeavour in as brief a manner as possible to explain its utility and action with reference to the subject of typhoons.

The first indications by the barometer of the presence, in its vicinity, of a typhoon is generally its oscillations or restless condition, which, though sometimes very small, not exceeding 01 of an inch, ought never to be disregarded.

A few cases are on record in which the oscillations at the mercury in the tube have reached 02, and of the same time the oscillation of the water barometer was 28 of an inch. These oscillations are caused by the disturbed condition of the atmosphere in front, and in the vicinity of the advancing gale. If the atmospheric fluid in which we live and breathe were visible to the eye, it would be seen on the approach of a typhoon to move in great waves over the barometer, like the undulations of a troubled sea after a heavy gale of wind; and as the [71] barometer measures exactly the weight of a perpendicular column of the air immediately above it, it in consequence rises and falls according as the atmospheric waves reach, pass over, and leave it.

The next thing worthy of notice is the fact that the barometer often rises just before the gale comes on; a fact which when properly understood will always put the seaman on his guard and give him timely warning, but a dangerous thing when not understood, as it tends to throw the seaman off his guard, and lull him to sleep, when he ought really to be wakeful and watching.

The cause of this phenomenon is evidently the air being banked up in front and by the pressure of the advancing gale; and can best be demonstrated by moving a large tub through a body of water, when it will be found that the water in front of the tub will be higher, and that the water behind the tub will be lower than that portion of the water which is not affected by the movement of the tub;—and this is just the case with the barometer, which as a rule is above in front of, and lower behind the gale than its average height, for the time being, in places not affected by the storm.

But we also find the barometer standing lowest at or near the centre, and this may be accounted for by the fact of a partial vacuum existing there from condensation of vapour, and the surrounding air rushing in to supply the vacancy, leaves room for neigbouring currents to expand and become lighter, a process which on this principle I suppose to be going on from the centre towards every part of the outer circumference; and the gradual fall of the barometer as a matter of course follows.

Now as the severity of a typhoon is measured by the velocity of the winds within the storm-disc—and we admit on the first principles that the greater the rapidity with which the currents revolve around the focus, the greater the condensation of vapour there, and hence the more perfect the vacuum at the centre—we shall have an explanation of the reasons why the barometer falls lower in a severe, than in a more moderate gale.

[72] Last of all we have the barometer as a measure of the distance from the centre, and although but little reliance ought to the placed on this, yet in some cases it might be of use in determining what to do with a ship caught in a typhoon.

By comparison of a great number of cases Mr. Peddington has constructed the following table, intended to guide the mariner in estimating the distance from the centre.

Average fall of Barometer. Per hour.	Distance from centre. In miles.	In time.
From 0.02 to 0.06	From 260 to 150	12 hours.
" 0.06 " 0.08	" 150 " 100	9 "
" 0.08 " 0.12	" 100 " 80	6 "
" 0.12 " 0.15	" 80 " 50	3 "

The above table gives the average of a greater number of barometer readings observed during typhoons principally at shore stations, where the observations have been made accurately and regularly, and from which the distance corresponding to each reading has subsequently been ascertained; but nothing is shown here nearer than three hours before and after the passage of the centre; the averages here registered apply respectively to 12, 9, 6 and 3 hours from the centre as marked in the table. After a typhoon has been blowing nine hours, no average fall can well be stated, as sometimes the barometer continues to fall at the same rate, and at other times (in cyclones of what Mr. Reddington calls the first class) falls when nearer than three hours from the centre, at a rate in proportion as 1 to 4 when compared with that of the former three hours.

If we examine the barometer readings during the typhoon which passed over Yokohama in August 1872, we shall find that this rule nearly corresponds with what was observed by myself during that gale.

It will be remembered that the diameter of this typhoon was 105 miles; its semi-diameter 52½ miles; that the entire storm-disc was seven hours passing over the [73] *Idaho* (or any other given point); and the time occupied by the semi-diameter in passing, 3½ hours.

During the first hour the fall of the barometer was 0.14 of an inch, during the second hour 0.20, during the third hour 0.44, and during the remaining 30 minutes 0.21, showing, in this instance, a proportion of fall, by comparison of the third with the first hour, in the ratio of 1 to 3; and the distance from the centre being 52½ miles when the fall of the barometer was 0.14 of an inch per hour, agrees nearly with Mr. Peddington's estimate of the distance with a corresponding fall of the barometer, his distance being 50 miles, with an average fall of 0.15 per hour.

I infer from this that the distance of the centre in a typhoon from any part of it may be calculated approximately by this method, providing the observer is on shore, has a good barometer and watches it closely.

The total fall of the barometer during the typhoons on record ranges from 1.00 inch to 2.70 inches; the latter in the case of the H.E.I.C.S. *Duke of York* off Kedgeree in 1833, from 29.00 to 26.30 inches.

"ARGYLESHIRE."

(See Diagram.)

The ship *Argyleshire*, here represented in a typhoon, was making a passage from Hongkong to Yokohama, and on the 11th of September was near the South end of Formosa, Botel Tobago bearing N.E., 28 miles. She was struck by a typhoon with the wind at N.N.E. and the centre bearing E.S.E., and the captain believing the gale to be travelling to the Northward, supposed himself to be in the left-hand semi-circle, and continued on the port tack heading to the Eastward as near his course as possible, thinking all the time the centre would pass to the Northward of his ship ere he could approach sufficiently near to be in any danger. He evidently had an eye to business, and judging from the manner in which he handled his ship afterwards that he was conversant with the Law of Storms, I am of opinion that he desired to approach the [74] centre, as near as would be consistent with safety, in order to take advantage of the westerly winds which he know he would find south of the centre, and by which he could lay his course for Yokohama and make good time. This would have been all right had the gale travelled north as he supposed, but the sequel in this case shows that seamen should never form hasty conclusions in cases where deliberation may be employed to advantage.

If the captain had hove the ship to at once, and awaited the first change of wind, he would have discovered that the gale did not—as he supposed—travel north, for in that case the shift would have been to the left of N.N.E. and not to the right as it actually occurred; but urged on I presume by zeal and ambition to make a quick passage, and do well for his owners, he kept on under a heavy press of canvas until spars and rigging threatened to give way, and the strain upon these momentarily increasing, he was compelled to heave to, which he did on the port tack, evidently still thinking he was in the left hand semi-circle.

But he was not long left in doubt as to his position, for his falling barometer, the rapidly increasing force of the squalls, and the shortening of the intervals between them, the approach of darker and denser clouds, and the appearance of lightning in great quantities all told the story of the centre coming nearer the ship, and the idea evidently just occurred to the captain that the gale was not travelling north as he supposed but coming to the westward, and that he was heading nearly for the centre, for he at once wore ship and put her on the starboard tack (the proper tack).

During the first 12 hours of the gale the ship sailed and drifted 118 miles S. 69° E. nearly E. S. E., (equal to 96 miles measured on the chord of the arc through which she passed) *and towards the centre, until within 28 miles of the latter she was put on the starboard tack.*

If this had been done at the beginning of the gale, she would not have approached the centre nearer than 150 miles; for the winds drawing to the eastward, as the gale advanced to the westward, she would have made no drift [75] to the southward, and she would have been in a safe position to receive the shifts—as each one would have been more aft—and the ship, coming up to the wind, would have been riding head on to the heaviest sea.

If we start with the *Argyleshire* from the beginning of the gale we may follow her on the broken curved line marked 1, 2, 3, etc., sailing E. by S. 68.5 miles, E. S. E. ½ E. 80 miles, S. E. ½ S. 26 miles, and after being hove to on the port tack, drifting S. by E. 6 miles. The wind gradually veering to the eastward—or to the right (unmistakable evidence of being in the right hand semi-circle) and at the last named point it was N. E. ½ N.

It will be remembered that while the ship was sailing to the S'd and E'd, the gale was advancing to the S'd and W'd at the rate of 8.4 miles per hour, and during 12 hours 100.8 miles, while the ship, in the same time having sailed 118 miles S. 66° E. and, as shown, above 96 miles on the chord of the arc of the storm-circle through which she passed. It follows that at the end of 12 hours she had passed through 196 miles of the storm-circle, on the chord of that arc, and nearly in direct opposition to the course of the gale.

Dropping a perpendicular from this point on the chord, it will cut

the line A. C. in the angle "A," and point out the actual *distance over this line* 216.7 *miles*, and her distance *from the centre at the time of wearing ship 86 miles.*

The numbers 1, 2, 3, etc., on the line A. C. point out the particular part of the gale that passed over the ship in her real position, by corresponding numbers on the broken curved line, and consequently her actual track through nearly one-half of the storm-circle, the point at the angle "A" in the storm-circle corresponding to the point "A" on the ship's track. On the starboard tack, the ship *during an interval of* 30.20 *hours* drifted and sailed W. ¼ N. 18 miles, N.N.W. ½ W. 17 miles, N. ⅞ E. 18 miles, N. by E. ½ E. 12.6 miles, N.E. ½ E. 27 miles, N.E. by E. ½ E. 28.8 miles, making good a course and distance equal *to N. 28° E. 88.5 miles*, [76] which, when measured on the chord is equal to 45 miles. The letters A., B., C., etc., on the line A., G., correspond to the same letters on the broken curve, marking the ship's track on the starboard tack, and point out the particular part of the storm that passed over the ship in her place on the curve, as indicated by such corresponding letter. The line A. G. also shows the ship's track through the last half of *the storm-circle, and measures* 314 *miles* corresponding to a distance on the chord equal to 300 miles. *The diameter of the storm-disc is computed at* 588 *miles, and its rate of travelling* 8.4 *miles per hour.*

It is here made evident that the *Argyleshire* passed through a distance in the storm-circle equal to 580.7 miles, contained within an angle of 115°, the chord of which runs nearly parallel with the course of the gale and measures 496 miles. The *Argyleshire* during the first half of the gale experienced the winds as follows: N.N.E., N.N.E. ½ E., N.N.E. ¼ E., N.N.E. ½ E., N.N.E. ¾ E., when the ship was hove to on the port tack, and the wind soon began to veer more rapidly, and in a short time veered to N.E. ½ N. The reason why the wind veered so slowly previous to heaving to was because she was running nearly direct for the centre, and therefore changing the bearing of it but slightly; and this circumstance ought to have attracted the attention of the captain to his mistake in supposing the gale to travel to the northward; for in that case, running as he was to the S'd and E'd, he should have changed the wind to the left—that is—from N.N.E. to N.

by E.N.N. by W.N.N.W. etc., etc., etc., until eventually, when he should have reached the southern portion of the storm-disc, he would have had the wind from the W'd, and gradually changing to the S'd and W'd.

"FRANCIS HENTY."

The *Francis Henty*, of Melbourne, Captain William Thomas Quayle, left the Saddles on the 4th of October, 1872, bound for Yokohama, and stood across the Tung-Hai, [77] or Eastern Sea, with a northerly gale for Van Dieman's Strait. The wind, however, hauled to N. E., and headed the vessel off, so that she could not fetch or lie up to her course, and on the morning of the 7th, running down on a course for Colnett Straits, she passed close to Ingersoll Rocks. Strong indications of typhoon to the S. E., and thick weather prevented the captain passing through the Straits. Low barometer, heavy cross swell, occasional flashes of lightning, and a general threatening appearance of the weather determined the captain to keep on the western side of the chain of islands and await the result of the coming gale. On the morning of the 8th barometer rose 0.2, from 29.80 to 29.50, a circumstance that caused the captain to think he was all clear of the typhoon, and so hauled up on the wind and passed through what he calls Monturoso Pass, between the islands of Tokara and Toka-shima, standing E. S. E., between Cape Monturoso and Macedonian Rocks, to a point in latitude 28 deg. 34 min. N. and long. 129 deg. 54 E., the ship's position when the typhoon commenced; but the wind having changed to E. S. E., Captain Quayle stood to the N. and E'd., and while doing so, the barometer rose to 29.70. This calmed the mind of the captain, who, up to this time, had been exceedingly anxious, in consequence of the proximity of land to leeward. He believed that he was all clear of the typhoon, and that it would pass on his quarter (to the N'd. and W'd.), but he was not destined long to rejoice in this sweet illusion, for he quickly discovered that he had misinterpreted the message of his faithful barometer, which soon after began to fall rapidly, and the wind increasing in due proportion, gave notice that the dreaded gale had caught him, and left him no way by which to escape without the risk of placing his ship in imminent danger, and being wrecked on

one of the numerous islands composing the Loo-Choo and Linschoten groups, should he attempt to pass through, as he was at this time unable to see anything but dark and frowning clouds which seemed to rest upon the surface of the ocean. In this dilemma he resorted to the only [78] thing left for him to do—hove his ship to on the starboard tack. The wind at this time blew with such fury that canvas, however small, exposed to its force, was instantly blown into ribbons and torn from the ropes. Gust after gust followed with increased violence, and the wind remaining nearly stationary, and the barometer falling rapidly, told the dreadful story that the centre was approaching.

Lightning descending in vertical columns (of what Capt. Quayle describes as vivid green) added horror to the scene; and it is only necessary to hear Mrs. Quayle (who, with her children, was on board at the time) tell the story of her troubles and anxiety during that fearful night, in order to appreciate more fully the necessity for avoiding the centre of these violent gales; a thing which may be generally accomplished with safety, if the mariner is conversant with the Law of Storms.

There are a few exceptional cases, in which there is no escape; and the *Francis Henty* furnishes an instance. She was practically land-locked to leeward, the land being shut out from sight by a black cloud in which the *Francis Henty* herself was enveloped, and uncertain of her position, to attempt to run through one of the narrow passages between the islands would have involved the ship and crew in great danger by grounding on some of the islands or rocks in their vicinity. So of two evils the captain chose the least; and preparing his ship by passing extra gaskets on the sails, lashing the spars and other things liable to get adrift, making hatches and skylights more secure, getting relieving and other tackles ready for instant use, etc., etc., he adopted the proper course by heaving to on the starboard tack, being in the right-hand semi-circle, and awaited the passing of the centre. This, in due time, took place. When near the centre, the ship was thrown on her beam ends with the yard-arms in the water, and was so kept by the fury of the wind pressing her down until the centre reached her, when she righted in the calm that followed. She was, however, not more safe there than when exposed to the [79] blast, for the heavy and irregular sea threatened every moment to swamp the ship.

During a light breeze, while the centre was passing, the Captain wore ship, and put her on the port tack to prevent (as he says) the ship from foundering against the lee sea, when the shift should come from the N.W.; and by this manœuvre he evidently saved his ship: for although somewhat out of order according to the Law of Storms—as he was in the right hand semi-circle still—yet subsequent events proved that he was right. The events to which I refer are the incurving of the winds, evidently caused by coming in contact with the chain of islands composing the Loochoo and Linschoten groups, and as the winds here represented are those that were felt at the ship, it will be noticed that as the ship drifted to the E'd, the winds became more Southerly; and the inference drawn from this fact is that the Island of Oho Shima (which is high land) arrested the course of the wind, and diverted it to a more northerly direction, so much so that, when the ship bore N.N.E. ½ E. 28 miles from the Northern point of Oho Shima, the wind at the N.W. by W. typhoon point, was actually S. W. drawing up between the Islands of Oho Shima and Tokashima (being diverted seven points); and had the ship been on the starboard tack then, she would have been taken aback by every shift, got sternway, and probably foundered.

If this be true of Oho Shima, it is also true of any other similar land, and an important lesson is taught by Captain Quayle's experience, viz:—When struck by a typhoon in the vicinity of land, remember that the contact of the wind with land diverts its course in proportion to the angle of contact, and, therefore, make proper allowance for such change in locating the centre, or in determining the tack on which to heave to.

This typhoon may be cited as a remarkable instance of the incurving of the winds by contact with land—which is here clearly established—but I doubt very much if any considerable out-curving of the wind could ever take place, even should the angle of contact with the land be such as [80] to give it a tendency in that direction, because of the atmospheric pressure being so much greater on the outside than on the inside.

By reference to the Diagram, we find the *Francis Henty* entering the typhoon in N.E. by E. quarter, or having the wind S.E. by S. and follow her through the first half of the storm-disc to the centre, the wind having changed but one point to S.E. This change of wind is the effect

of having changed the bearing of a centre, first by running to the northward and eastward on a course inclining towards the track of the typhoon; and secondly, by heaving to and drifting to the northward and westward. Run and drift together during 11¼ hours, making good a course and distance N. 7° 55′ E. 685 miles—on the line marked D.R. 1., and following her from the centre out, we find that she is drifting to the eastward making good a course and distance S. 88° 24′ E. 44.37 miles to the line marked D.R. 2: but at the end of the typhoon, the Captain discovered the Macedonian Rocks 7 miles to leeward, bearing S.S.W. ¾ W. and 71 miles S. 52° W. of the point where his reckoning placed him. This indicates a strong current having affected the drift of the ship during the gale, at the rate of 3.24 miles per hour, S. 42° W. of S.W. ¾ W. Applying this current to the course, through the first half of the storm-disc, we shall find that the ship travelled, through the storm-disc, on the straight line marked 1, 2, 3, 4, 5 and 6., and that her track over the ground was on the broken line having the corresponding marks; also that her course through the last half of the storm-disc, lies on the straight line marked A, B, C, D, and E, and that her actual drift over the ground is indicated by the curved line similarly marked.

Diameter of the storm-disc, 360 miles, and rate of travelling 16 miles per hour, N.E. Diameter computed from the time required for the *Francis Henty* to pass through the storm-disc, and the rate of travelling obtained by having the bearing and distance of the centre from two known points, at different times, and the elapsed time during the interval.

[81] I have confined myself so far to data and figures, absolutely necessary for the explanation of my diagrams, and will not tire you with a recital of the computations by which I have arrived at the above conclusions, and upon which I base my assertions; but should any person here present desire to investigate the subject more fully, I shall be most happy to show the computations, and render such explanation as may be desired to clear up any little point imperfectly understood.

CAPTAIN QUAYLE'S LETTER.

"Left Saddles at 1 A.M. on the 4th October; with fresh northerly

gale and high sea, wind veering to N.E., found it impossible to pass through the straits of Van Dieman. On the 7th passed close to Ingersoll Rocks, but weather so bad did not go through the claws, having indications of a typhoon to the south'd and east'd. On the 8th October glass rose 2.10, thought I was clear of typhoon; wind E. S. E., thought it would pass on my quarter; went through the Monturoso pass with strong gale; stood to the north'd for eight hours, then tacked to the N. E., barometer 29.50. As I stood to the north glass rose to 29.70, thought I was all clear. Lee shore distant 30 miles made me very anxious. At 11 P.M. glass began to fall rapidly, and wind came out steady at S. E. by S., the typhoon having evidently struck the Loo Choo Islands and recurved, coming right down on the ship. Stood north as long as possible under heavy press of sail. At midnight on the 8th barometer 28.65, blowing terrific gusts, sea resembling church steeples. At 8 A.M. 9th October, barometer 28.21, took in main topsail, and put ship on starboard tack, being in the right-hand semi-circle; at 4.30 the scene was fearful; gust upon gust, and sea running high but not breaking owing to the wind. At 6 A.M. barometer 27.50, men lashed on deck; nothing visible of ship but a portion of her weather deck, on her beam-ends, yard-arms in the water; when at 7 A.M. barometer 27.29, suddenly it lulled and the centre passed. Drift, up to this time, 5½ knots per hour, N. W., [82] was expecting every moment to hear the ship crashing on the reefs. Wore ship during a little gust in the centre, and put her on to port tack to prevent her from foundering against the lee sea when the wind should shift. The second mate washed overboard while wearing, but managed to crawl on board again. The bulwarks all washed away. In the course of 30 minutes the shift came, N. W., terrific blowing, harder than before, throwing ship down, washed away cabin and all my effects, nearly wife and children. At 8 A.M. 9th gave up hopes of ship and crew; compressed air below blowing up hatches and scuttles in the cabin; barometer at this time 27.19, clouds resting on the water, and the scene was fearful. The lightning falling in a vertical column of vivid green; the wind constantly veered to the south'd and west'd, and at midnight the wind was S.W., blowing a fresh gale; set storm canvas to steady the ship. Oct. 10th A.M., daylight,

gone down to moderate gale, but high sea. At noon the reefs in sight were seven miles to leeward. The whirl of the storm kept the ship off."

CHART OF BAROMETER CURVES.

(See Diagram.)

The Chart shows the barometer curves as indicated by the barometers of the respective ships herein named: the *Argyleshire*, Sept. 1872, the *Francis Henty*, October 1872, and the *Idaho* August 1872. An inspection of these Diagrams affords a comparison of the gales as to size and severity, supposing the fall of the barometer to be a measure of the latter. The chart is constructed on a scale of 20 nautical miles to an inch, or say $\frac{1}{1,520,000}$ part of the actual size (nearly).

Hence, the length of the Diagrams shows the diameter and relative diameters, and the form of the barometric curves, the severity and relative severities of the gales which they are made to represent: Thus it would appear that the *Argyleshire* typhoon, although larger than either of the other two, was not so severe; since at a distance of 204 miles from the circumference, the fall of [88] the barometer was only 0.98 inch; but it will also be noticed that the *Argyleshire* did not pass nearer to the centre than 86 miles, and the lowest barometer reading was at 90 miles from the axis of the centre, and 45 miles from the actual boundary line of the calm space; it is therefore probable that her barometer might have fallen another inch before reaching the central axis, but this, of course, I have no means of knowing, except by comparison with the fall of the barometer during the Yokohama typhoon, August 1872, in which the barometer fell 1.01 inches from the beginning to the axis of the centre, a distance of 52½ miles.

Next, we notice the *Francis Henty's* typhoon, and observe the barometer falling rapidly, showing a total depression of 2.15 inches. This was an exceedingly severe gale, and the fall of the barometer went far below the average, the greatest fall recorded heretofore being 2.8 inches,

and the average of excessive fall of the barometer recorded does not exceed 2 inches. 1.96 inches, I think are the figures.

The diameter of this gale was 360 miles. and the calm space in the centre 60 miles.

Next, and last, we have the Yokohama typhoon, which occurred on August 25th, 1872.

The barometer, during this gale, was observed by myself every 15 minutes from the beginning to the end, and I have, therefore, no hesitation in saying that this curve is accurate and complete. The total fall of the barometer was 1.01 inches. The diameter was 105 miles, and the calm space in the centre, 15 miles.

In connection with the fall of the barometer, it will perhaps be proper to remark on Captain Quayle's idea of the compressed air below blowing up the hatches and scuttles in the cabin, as stated in his letter. That this circumstance should not be attributed to the compression of the air, but just the opposite, to expression of the air, may be explained in this way: When the ship entered the storm circle, with a high barometer, a quantity of air of the same density as the surrounding atmosphere was confined [84] below; and this being unable to escape as the barometer fell, owing to the tightness of the hatches, eventually, when the barometer fell very low, and consequently the outside pressure was partly removed, expanded and forced up the hatches, or such portions of the deck confining it as happened to be weakest. This would not have occurred a second time, as an equilibrium of forces was soon established, and the pressure equalized on both sides.

There are two essential rules of vast importance to the seaman to be remembered in connection with circular gales, and which will always be a sure guide.

The first of these is: That the wind in the right-hand semi-circle always changes to the right of the point from which it blows; and the second, that the wind in the left-hand semi-circle always changes to the left of the point from which it blows.

This is true in both hemispheres.

Two other rules should be remembered as equally important. The

first is: That in the Northern Hemisphere the bearing of the centre of the gale is always eight points to the right of direction of the wind—as when the wind is N. the centre bears E. The second is: That in the Southern Hemisphere the bearing of the centre is always eight points to the left of the direction of the wind, as when the wind is N., the centre bears W.

Two other rules of equal importance should be remembered. The first is: In the right-hand semi-circle heave-to on the starboard tack. The second is: In the left hand semicircle heave-to on the port tack—in both hemispheres.

It will then be seen that a ship laying-to in the right-hand semi-circle in the Northern Hemisphere will be on the starboard tack, and heading off from the centre; and in the left-hand semi-circle, will be on the port tack, and with her heard towards the centre. Also: In the Southern Hemisphere, a ship laying to in the right hand semicircle, will be on the starboad tack, but heading towards the centre; and when in the left-hand semi-circle will be in the port tack, but heading off from the centre.

[85] Upon a knowledge of these simple and few rules depends the safety of a ship; and these contain all that is necessary to locate the position of a ship with regard to the bearing and movement of the centre, as the direction of the wind gives you at once the bearing of the centre, and several consecutive bearings of the centre will give you, approximately, its movements; while the first change of wind will tell you whether you are in the right or left hand semi-circle. Thus located in the storm circle the rest depends on the judgment of the commander.

To demonstrate these rules would require a number of diagrams and more time than, perhaps, the greater portion of this audience would be willing to give to a subject of that kind, which would necessarily be dry, and of little interest to any; but such few as may happen to be connected with the sea, or are otherwise desirous of investigating the matter more fully, I would refer to the works of Reddington, Reid, Redfield, Dove and others for a full and complete discussion of the matter. Yet to the practical seaman, who wants a great deal of sub-

Date. Day.	Time.	No. of Hours.	Point on Chart.	Winds. Direction.	Force.	Condition of Weather.	State of Sea.	Bar.	Ther.	Courses made good.	Difference of Latitude. N.	S.	Departure. E.	W.
Sep.12	0	0	1	N.N.E.	6	o c	M.	29.95	78	..	..	..	..	..
"	5.18a.m.	5.3	1 & 4	N.N.E. ½ E.	7	o c u q	R.	29.70	"	S. 7 E. 68.5	..	12'.4	62'.3	..
"	"	"	"	"	7	o c q r u	"	29.52	"	..	..	..	..	..
"	8.18.a.m.	3	4 & 5	N.N.E. ½ E.	8	"	"	29.32	"	S. 6⅝ E. 30	..	8.7	28.7	..
"	10.48a.m	2.5	5 & 6	N.N.E. ½ E. / N.N.E. ⅝ E.	9	o c q r u l	"	29.12	"	S.8 9/16 E. 26	..	20.9	15.5	..
"	12 Noon	1.2	6 & a	N. E. ½ N.	10	"	"	29.02	79	S. 1 E. 6	..	5.9	1.2	..
										Difference of Latitude and Departure to Centre=	..	47'.9	107'.7	
Sep.12	3.42 p.m.	3.7	a & b	East	10½	o c q r u i	R.	29.02	79	N.7⅜W.–13	1'.3	..	..	12'.9
"	8.36 p.m.	4.9	b & c	S.E. by E. ¾ E.	10½	"	"	29.28	78	N.2¼W.–17	15.8	..	..	6.0
"	4.36 a.m.	8.0	c & d	S.E. ¾ E.	9	o c q r u	"	29.35	76	N. ⅛ E.–18	17.5	..	3'.7	..
"	10.12am.	5.6	d & e	S.E. ½ E.	9	"	"	29.58	74	N.1½E.–12.6	12.1	..	3.7	..
"	2.12 p.m.	4.0	e & f	S.E. ⅜ E.	8	o c q r	"	29.79	73	N.1½ E.–27	14.1	..	20.9	..
"	6.15 p.m.	4.05	f & g	S.E. ¼ E.	7	o c q	L.R.	29.90	71	N.5⅛E.–28.6	16.0	..	24.7	..
"	"	..	g	S.E.	5	b c	"	29.98	71	..	76'.8	..	53'.0	20'.9
													20.9	
										Difference of Latitude and Departure from Centre to end=	76'.8	..	32'.1	

COMPUTATION FOR TRACK FROM BEGINNING TO CENTRE.—*Port Tack.*

Difference of Lat. 47.9 and Departure 107.7, gives a course S. 66° E. and Distance 118 Miles.

Lat. left at the Beginning.....	21° 48′ 00″ N.	Longitude left at the Beginning.....	121° 14′ 00″ E.
Port Tack, Lat. made during 12 hours.....	47′ 54″ S.	Long. made during 12 hours.....	1° 56′ 00″ E.
Position, noon 12th wore ship.....	21° 00′ 06″ N.		123° 10′ 00″ E.

COMPUTATION FOR TRACK FROM CENTRE TO END.—*Starboard Tack.*

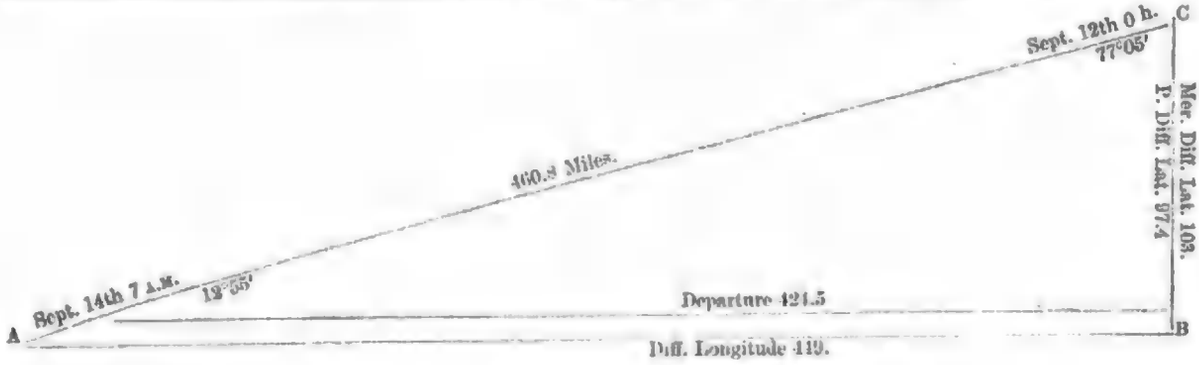
Difference of Lat. 76.8 and Departure 32.1, gives a course N. 23° E. and Distance 83.5 Miles.

Lat. left centre or time of wearing ship.....	21° 00′ 06″ N.	Longitude	123° 10′ 00″ E.
Lat. made on Stbrd. Tack 30.36 hours.....	1° 16′ 48″ N.	Longitude	34′ 30″ E.
Position, end of Typhoon.....	22° 16′ 54″ N.		123° 44′ 30″ E

COMPUTATION FOR RATE OF TRAVELLING.

Position *Argyleshire* September 12th, 0.00 hour.....	21° 48′ 00″ N.	121° 14′ 00″ E.
Centre bearing E. S. E. 294 miles. Diff. Lat. S. 112.5 and Dept. 271.6 E.	1° 52′ 30″ S.	4° 58′ 00″ E.
Position of Centre 0.00 hour Sept. 12th, 1872.....	19° 55′ 30″ N.	126° 07′ 00″ E.
Position of Barque *Malvera* 7 a.m. September 14th.....	21° 46′ 00″ N.	114° 54′ 00″ E.
Centre bearing S. E. 294 miles. Diff. Lat. S. 207.9 and Dept. 207.9 E.	8° 27′ 54″ S.	8° 44′ 00″ E.
Position of Centre September 14th, 7 a.m	18° 18′ 06″ N.	118° 38′ 00″ E.

Position of Centre 0 hour September 12th.....	19° 55′ 30″ N.	126° 07′ 00″ E.	P. D. Lat.....97.4 Miles.
Position of Centre 7 a.m. September 14th.....	18° 18′ 06″ N.	118° 38′ 00″ E.	Mer. Diff. Lat..... 103 Miles.
Change of Position in 55 hours.....	1° 37′ 24″	7° 29′ 00″ E.	Diff. of Long ..... 449 Miles



		h.	m.	sec.
Sept. 12th.....	0 00 00	0	00	00
" 13th.....	0 00 00	24	00	00
" 14th.....	0 00 00	24	00	00
" 14th.....	7 00 00	7	00	00
		55	00	00

103 : R : : 449 : tan. C.

$$\text{Tan. C} = \frac{R \times 449}{103} = \text{S. } 77^\circ\ 05'\ \text{W.}$$

R : 103 : : Sec. C : A C

$$\text{A C} = \frac{103 \times \text{Sec. C.}}{R.} = 460.8 \text{ miles}$$

Elapsed time between two known positions of the Centre 55 hours; Whole distance traversed by the Centre during that interval 460.8 miles; hence $\frac{460.8}{55}$ = 8.4 miles rate per hour nearly.

Port tack ..... S. 66° E.—118 miles; Star. tack ..... N. 23° E.—83.5 " } = N. 78 E. 141 miles = to the distance made good on the Chord connecting the two ends of the arc of the storm disc through which the "Argyleshire" passed.

LENGTH OF CHORD.

		96.	Miles.
Port Tack.	Ship sailed 12 hours S. 66° E. 118 miles equal when transferred to the Chord (N. 78° E.) to		
	Gale advanced in 12 hours—8.4 miles per hour	100.8	"
Starboard Tack.	Gale passed over Ship while hove to 22.21 hours	186.564	"
	Ship sailed 8 hours N. 23° E.—83.5 miles—equal when transferred to the Chord (N. 78° E.)	45.000	"
	Gale advanced in 8.05 hours 8.4 miles per hour	67.62	"
	Length of Chord as measured by the Ship passing through	495.984	Miles.

DIAMETER OF STORM DISC.

An arc of 115° having a Chord of 496 miles corresponds to a Radius of 294, and consequently to a Diameter of 588 miles, which is the Computed Diameter of the "Argyleshire" Typhoon.

FRANCIS HENTY.

From Beginning to Centre.

Date. Day.	Date. Time.	No. of Hours.	Point on Chart.	Wind. Direction.	Wind. Force.	Condition of Weather.	State of Sea.	Bar.	Ther.	Courses made Good.	Difference Lat. N.	Difference Lat. S.	Dep'ture. E.	Dep'ture. W.	Distance from Centre.
Oct. 8	7 p.m.	0	1	S. E. by S.	8	o. c. r. q.	B.	29.50 / 29.70	76	none.	..	..	..	..	160
" 8	9 p.m.	2	1 & 2	"	9	"	"	28.65	"	N. 1¼ E.=16	15'.5	..	3'.9	..	150
" 9	0.45 a.m.	3¾	2 & 3	S. E. ¾ S.	10	"	"	28.30	"	N. 2 E.=27.5	25.4	..	10.5	..	117
" 9	2.30 a.m.	1¾	3 & 4	S. E. ¼ S.	11	u.o.c.r.q.l.	"	27.50	"	N. 3¾ E.=12	8.9	..	8.1	..	88
" 9	5.30 a.m.	4	4 & 5	S. E. ½ S.	12	"	"	27.19	78	N. 3¼ W.=22	17.7	..	..	13'.1	59
Current		11½	6 to a	Calm.	0	o. c. l.	R. C.	27.19	"	S. 52° W.=37	..	22'.8	..	29.2	30 & 0
											57'.5	22'.8	32'.5	42'.3	
											22.8	..	..	22.5	
										Difference of Lat. and Departure from beginning to centre=	44'.7	..	..	19'.8	

From Centre to End.

Oct. 9	9.30 a.m.	3	a	Calm.	0	o. c. l.	R. C.	27.19	78	S. 4⅜ E.=14	..	8'.8	11'.2	..	....
" 9	11 a.m.	1½	a to b.	N. W.	12	u.o.c.r.q.l.	"	27.20	"	S. 6½ E.= 7	..	2.4	6.6	..	....
" 9	0.30 p.m.	1½	b to c.	N.W. by W. ¼ W.	11	"	"	27.25	"	S. 7½ E.= 7	..	1.0	6.9	..	....
" 9	2 p.m.	1½	c to d.	W. ¾ N.	10	"	"	27.75	"	N. 7½ E.= 6	0'.3	..	6.0	..	....
" 9	3.30 p.m.	1½	d to e.	W. S. W. ¾ W.	9	n.o. c. r. q.	R. .	28.00	77	N. 6¾ E.= 5	1.2	..	4.9	..	....
" 9	5 p.m.	1½	e to f.	S. W. by W.	9	o. c. r. q.	"	28.40	"	N. 5½ E.= 5	2.1	..	4.5	..	....
" 9	6.30 p.m.	1½	f to g.	S. W.	8	o. c. q.	"	29.10	"	N. 4½ E.= 5	3.0	..	4.0	..	....
Current	....	10½	g.	S. W.	7	b. c.	"	29.40	76	S. 52° W.=34	..	20.9	..	26'.8	....
											6'.6	32'.6	44'.1		
												6.6	26.8		
										Difference Lat. and Departure made good from Centre to End =		26'.0	17'.3		

Computation from Beginning to Centre.

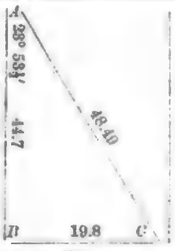
Latitude left at 7 p.m., October 8th (Beginning) .. 28° 34′ 00″ N.
Lat. made during 11½ hours till 6.30 a.m., Oct. 9th .. 44′ 42″ N.

Lat. of *Francis Henty* in centre of Typhoon ..... 29° 18′ 42″ N.

Long. left at 7 p.m., Oct. 18th (Beginning) ..... 129° 54′ 00″ E.
Long. made during 11½ hours till 6.30 a.m. Oct. 9th .. 22′ 42″ W.

Long. of *Francis Henty* in centre ..... 129° 31′ 18″ E.

Typhoon commences at 7 p.m., October 8th.
Typhoon ends at 6.30 p.m., October 9th.



44.7 : R :: 19.8 : tan. *A*.

$$\text{Tan. } A = \frac{R \times 19.8}{44.7} = \text{N. } 23^\circ .53\frac{1}{2}' \text{ W.}$$

Sin *A* : 19.8 :: Sin *B* : side *AC*.

$$\text{Side } AC = \frac{19.8 \times \text{Sin } B}{\text{Sin } A} = 48.49.$$

Difference of Longitude corresponding to 19.8 Departure on the 29th parallel = 23′ 42″.

Computation from Centre to End.

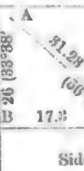
Lat. left at Centre ..... 29° 18′ 42″ N.
Lat. made 12 hours to 6.30 p.m. ..... 26′ 00″ S.

Lat. end of Typhoon ..... 28° 52′ 42″ N.

Longitude left at Centre ..... 129° 31′ 18″ E.
Longitude made 12 hours to 6.30 p.m. ..... 19′ 46″ E.

Longitude end of Typhoon ..... 129° 51′ 04″ E.

Typhoon centre passed at 6.30 a.m., October 9th.
Typhoon ends at 6.30 p.m., October 9th.



26 : R :: 17.3 : tan. A

$$\text{tan. } A = \frac{R \times 17.3}{26} = \text{S. } 33^\circ 38' \text{ E.}$$

sin A : 17.3 :: Sin B : AC

$$\text{Side } AC = \frac{17.3 \times \text{Sin } B}{\text{Sin } A} = 31.28$$

Difference of Longitude corresponding to 17.3 miles departure on the 29th Parallel is = 19′ 46″.

Leaving out the Currrent the position of the "Francis Henty" at the centre and end of Typhoon would have been as follows :—

From beginning to centre, Course and Distance by DR = N. 7° 55′ E. 68.5 miles
" Centre to end, " " " = S. 33° 24′ E. 44.7 "

Account Centre	29°	41′	30″	N.	130°	05′	00″ E.
Obser. "	29	18	42	N.	129	31	18 E.
	22′	48 S.			33′	42	W. = Current S. 52° W. 37 miles.
Account End	29°	36′	24″	N.	130°	55′	30″ E.
Observation End	28	52	42	N.	129	51	04 E.
	38′	42″ S.			1°	04′	26″ W. = Current S. 51° 60½′ W. 71.22 miles,

Whole time under influence of current = 22 hours, hence $\frac{71.22}{22}$ = Current per hour = 3.24 miles.

Computation for Length of Track and rate of travelling.

On the 9th Oct. at 6.30 a.m.—The Centre passed over the "Francis Henty" in Latitude 29° 18′ 42″ N., and Longitude 129° 31′ 18″ E.

At 5.48 p.m. Oct. 10th—The Bark "Hilda" being at that time in Latitude 34° 20′ N., and Longitude 138° 10′ 00″ E. was struck by the Typhoon with the wind East, and just on or near the outer circle of the storm, hence the centre bore from her South 180 miles, and consequently its position at that time, 31° 20′ N. 138° 10′ E.

Position of Centre 6.30 a.m. Oct. 9th	29°	18′	42″ N.	129° 31′ 00″ E.
" " 5.48 p.m. " 10th	31°	20′	00′ N.	138° 10′ 00″ E.
Difference of position in 35.3 hours	2	01	18 N.	8° 39′ 00″ E.

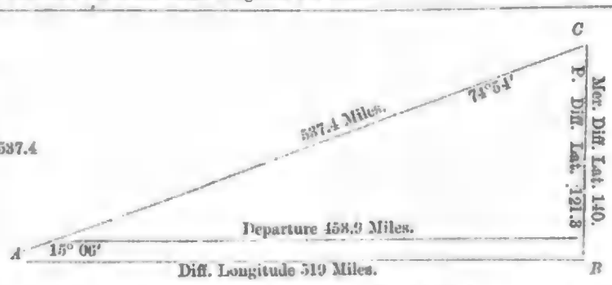
P. Difference Lat. 121.3 Miles—Mer. Diff. Lat. 140 Miles—Diff. Longitude 519 Miles.

140 : R :: 519 : tan. *C*.

$$\text{tan. } C = \frac{R \times 519}{140} = \text{N. } 74^\circ 54' \text{ E.}$$

R : 140 :: Sec. *C* : Side *A*. *C*.

$$\text{Side } A.C. = \frac{140 \times \text{Sec. } C.}{R.} = 537.4$$



537.4 Miles is the length of a straight line between the two positions of the centre; but the track is a curve, and by raising a perpendicular and making it equal 85.2 Miles at a point on the straight line 196 Miles from the first position of the centre, then drawing lines from both centres to the upper end of this perpendicular, we shall have an obtuse angle = 142° 29′ with its two adjacent sides representing nearly the curve, and consequently very nearly its length, and the distance over which the gale passed in 35h. 18m., the elapsed time during the interval.

196 : R :: 85.2 : tan. *A*.

$$\text{Tan. } A = \frac{R \times 85.2}{196} = 23^\circ 30'$$

Sin *A* : 85.2 :: Sin *B* : *AC*.

$$AC = \frac{85.2 \times \text{Sin } B.}{\text{Sin } A} = 213.7 \text{ Miles.}$$

341.4 : R :: 85.2 : tan. *E*.

$$\text{Tan. } E = \frac{R \times 85.2.}{341.4} = 14^\circ 01'$$

Sin *E* : 85.2 :: Sin *B* : *C E*.

$$C\,E = \frac{85.2 \times \text{Sin } B.}{\text{Sin } E.} = 351.8 \text{ Miles.}$$

Sum of two sides 565.5 Miles.

	h.	m.
Elapsed time during interval	35	18
Whole distance traversed	565.5	Miles
Rate of speed per hour	16.02	Miles.

stantial information in a concentrated form, I should recommend some of the smaller works written on the subject, all of which are more or less adapted to the wants of the practical sailor. A small work of that kind, entitled "Weather Guides," is one of a number of other useful books written by Rear-Admiral T. A. Jenkins, U.S.N., while he was doing duty as Chief of the Bureau of Navigation, in Washington, D.C., and is an excellent book for reference and consultation when you wish to get an idea quickly and do not have time to hunt it up in the larger works.

RUSSIAN DESCENTS IN SAGHALIEN AND ITORUP IN THE YEARS 1806 & 1807.*

By W. G. Aston, Esq.

[*Read before the Asiatic Society of Japan, on the 7th June, 1878.*]

[86] The following account of Russian descents in Saghalien and Itorup has been prepared from a collection of Japanese manuscripts comprising the private correspondence of officials on duty at Hakodate, together with proclamations and other official documents.

The causes of these Russian descents are to be looked for in the events of the previous four or five years. The Russians had already made several attempts to open trade with Japan. Applications of this kind which were made to the Japanese authorities in Yezo were always referred to Nagasaki, and at last an embassy was sent there bearing a letter from the Czar to the Tycoon in which a Commercial Treaty was asked for. The Russians were delayed at Nagasaki for several months awaiting the answer of the Japanese Government. It was to the effect that they could by no means deviate from their ancient policy of seclusion, and was accompanied by an order from the Government of Nagasaki to quit that port immediately.

The irritation felt by the Russians at the ill-success of their mission must have been increased by an event which took place about the same time. Fourteen Russians who had ventured to land on the island of Itorup in hopes of [87] being allowed to trade were seized by the Japanese garrison there and thrown into prison, where they remained till the following year, when they made their escape.

*Revised by the Author.

In the autumn of the year 1806, two small Russian men-of-war arrived at Kushunkotan, the principal Japanese settlement in Saghalien. The united crews of these two ships amounted to no more than sixty-four or sixty-five men. On arriving at Kushunkotan, we are informed that they fired poison-smoke-guns, after which a party landed in boats and pillaged the godowns, carrying off the rice and whatever other valuables they could find. They also carried off seven or eight of the Aino inhabitants and one Japanese soldier, setting fire to the place before they went. The Russians nailed up a plate of copper on the Tori-i of the temple of Benten, with an inscription to the following effect:—

I. It is unjust of the Japanese to prohibit trade with the Russians in Saghalien.

II. If the Japanese should change their minds and wish for trade, they might send a message to Saghalien or Urup.

III. If the Japanese persisted long in refusing justice, the Russians would ravage the northern parts of Japan.

The approach of winter prevented the Russians from carrying their menaces into effect this year. One of the ships retired to Urup for the winter, and the other to Kamschatka.

Meanwhile, the news of the Kushunkotan affair had produced great alarm and excitement. The copper tablet was sent to Yedo, where it seems to have been taken as a declaration of war by Russia. Active preparations were made for repelling any future attacks which might be made. A body of 150 men was despatched at once to Kushunkotan, but arrived too late to be of any service. Two hundred Tsugaru soldiers were soon after posted at Soya, a settlement near the northern point of Yedo, and opposite to Kushunkotan. The garrison of Itorup was increased to 200 or 300 men, and by the spring of next year that of Hakodate was raised to about 2,500 men, mostly retainers of the northern Daimios.

[88] Extensive preparations were also made on the main island of Japan. Bodies of troops were stationed at all the seaboard villages in the northern provinces, and the Daimios were urged to increased vigilance in guarding their coast.

The diary of an official who was travelling northward about this time gives a lively picture of the bustle and excitement along the great

northern highway. Couriers were constantly passing backwards and forwards between Yedo and Hakodate, and between the Daimios' yashikis in Yedo and the provinces, carrying despatches wrapped in oil-cloth covers; and the road was thronged with troops equipped in the old fashion—some with bows and arrows, and others with spears and matchlocks—while occasionally a Daimio or Governor monopolized the way with his train. The transport service necessary for these movements of troops and officials was a grievous burden on the farmers, and many of them, to escape it, preferred to abandon their holdings and conceal themselves among the hills.

Another writer gives the following account of the train of a Governor of Hakodate.

The procession was preceded by a man whose duty it was to clear the way by the well-known "Shitani! Shitani!" the signal for every one to squat by the roadside till the great man had passed.

Next came a body of 12 foot soldiers, in two files of six men each.

Next two war-conch blowers.

Two drummers.

Eight matchlock men.

Two men carrying ammunition.

Two men carrying arrows.

Eight archers.

Three Samurai.

Three men carrying the emblems of the Governor's rank.

Two men with the Governor's private matchlocks.

Two men with the Governor's bows.

[89] Two men carrying the two lances indicating the Governor's rank, with two others as reliefs.

Six foot-soldiers.

Two halberdiers.

The Governor himself on horseback, his horse led by two grooms.

Six Samurai.

Two Doctors.

Three men bearing—one, the Governor's sandals, one his umbrellas, and one his camp-stool.

Two men bearing the lances of officers in the Governor's train.
Three men with baggage.
Three men with the Governor's tea and luncheon necessaries.
Two men to preserve order on the march.
Two grooms with spare horses.
Two men with straw shoes, etc., for horses.

Several subordinate officials with a suite of from two to nine persons brought up the rear, the whole amounting to 128 persons. This body of men seems to have been considered a warlike force, and is spoken of as an army; but of the entire number only thirty-six seem to have been really fighting men.

In the spring of 1807, as soon as the sea was open for navigation, the Russian ship which had wintered in Kamschatka joined her consort which had remained at Urup, and shortly after they appeared in company at one of the Japanese settlements in Itorup.

At this time the Japanese colony of Itorup was in a tolerably flourishing condition. It had been established more than ten years before, and had now a population of more than a thousand Ainos and 350 or 300 Japanese, including five women. Most of the Japanese were, however, soldiers from Nambu and Tsugaru. There is no mention of any trading population, except a *saké*-brewer from Akita who had established a brewery to supply the garrison. The Aino population was engaged in the fishery of *masu*, a species of salmon. Its oil was expressed, and [90] both oil and refuse sent to Hakodate. In the winter the Ainos hunted the bears for their skins.

The climate of Itorup is described as being not very severe in the early part of the winter. In February, however, the sea freezes for fifty or sixty *ri* and remains frozen until May. Snow falls along the sea-shore to a depth of five or six feet, and in the mountains to a depth of thirty feet or more; and the ground freezes to such a depth that it requires weeks of warm weather to thaw it. It is not till the end of July that all traces of frost disappear.

There were two Japanese settlements in Itorup. The chief one was at Shana, where the garrison was stationed. A building had been erected at great expense for the officials from Yedo and their troops, which is described by the *saké*-brewer as exactly like a Daimio's Castle.

It was surrounded by a stone wall, no doubt an uncommon sight in those parts. There was a minor establishment at a place called Naiho.

It was at Naiho that the Russian ships first made their appearance. The Japanese account states that about 200 men landed, fired muskets and great guns, broke into the guard-house and carried off clothes and other valuables, setting fire to the settlement before returning to their ships. They also carried off with them five Japanese whom they had taken prisoners. The remaining inhabitants fled to Shana, where the Russians made their appearance a short time after.

The two principal officers of Shana were absent, and the duty of defending the settlement fell upon a subordinate named Toda Matadayu. He had at his disposal a force of over 200 men, armed chiefly with matchlocks, and the Castle was defended by a few small cannon, posted however in such a position that they could be fired in one direction only.

Notwithstanding the advice of his colleagues, who reminded him of the behaviour of the Russians at Naiho a few days before, Toda resolved to try to open negotiations with them. He sent the chief interpreter of the settlement with four or five other Japanese and a number of Ainos [91] to meet a party of 17 (one account says 20) Russians who landed near the Castle. The interpreter and his party were fired into, and one of the Ainos killed. The interpreter was himself shot through the thigh, but the Ainos hoisted him on their shoulders and carried him back to the Castle. There was now a good deal of desultory firing on both sides. The Russians ensconced themselves behind an oil-pressing shed which stood on the beach, and the Japanese did not venture out from their castle. The distance between the combatants was 160 yards, and as both parties were well sheltered, little damage was done on either side. The only casualties we hear of were one Russian and two Japanese killed, and a few wounded. In an hour or two from the time they landed, the Russians re-embarked, to the great delight of the Japanese garrison, who were overjoyed at their easy victory over the dreaded "red men," as they called the Russians. So secure did they feel on that night that they neglected the most ordinary precautions. Before the appearance of the Russian ships we hear of watch-fires kept burning, and night-guards posted on all the neighbouring headlands; but everything of the kind seems to have been neglected on this night, when a

force landed from the Russian ships. Soon after dusk they were able to approach the Castle before any alarm was given, and the first intimation of their presence was a volley of musketry. There was no time to organize any resistance ; every one was seized with a sudden panic and fled to the hills, with the cry "*ware ichi*," which may be freely translated "*sauve qui peut.*" They did not feel safe till they had reached a hill-top a *ri* distant from the castle. Here they halted, and as everything seemed quiet they ventured down to the sea beach ; but they espied a Russian ship not far from the shore, lying in wait, as they thought, to intercept their retreat ; they again took to flight and concealed themselves in the woods. That night when all were buried in sleep they were awakened by a loud cry from Toda. Unable to endure the disgrace of defeat he had committed suicide in the approved Japanese fashion by disembowelling himself. [92] One of his comrades pertinently remarked that it was all very well for Toda to die, but that it was a pity he had not chosen to die honourably in battle rather than die the death of a dog as he had done. After Toda's death his men made the best of their way through the hills and woods of Itorup towards Kunashir. They suffered great hardships on the way, having for three days nothing to eat except such roots and berries as they could find. Some unhulled rice boiled in one of their helmets was thought a great luxury. From the western end of Itorup they crossed over in boats to Kunashir, and from there they afterwards returned to Hakodate.

The Russians could not at first believe that the Japanese had really abandoned their Castle. They feared an ambush, and waited till morning before entering. They then carried off all the rice, *sake* and *shoyu* they could find, and what hurt the vanity of the Japanese more than anything else, the ornamental spears and halberds set up at the entrance to the Castle. Their next step was to burn everything,—the Castle, the barracks, the the brewery, even the huts of the Ainos. The desolation was complete—nothing was left. They then returned to their ships, leaving behind two unfortunate men who had got drunk and had fallen asleep in a shed. Here they were afterwards discovered by the Ainos, who with the help of a Japanese who had not joined the general flight transfixed the poor fellows with spears as they lay asleep. Their heads were afterwards salted and sent to Hakodate, along with their clothing and arms.

The news of the Itorup affair spread rapidly throughout Japan. The officials on duty at Hakodate wrote reports of it in their letters to their friends at Yedo. These letters were sometimes addressed to a large circle of acquaintance and were at any rate eagerly copied and passed from hand to hand. Among persons who had not access to such authentic sources of information, the wildest rumours were rife. One account raised the number of Russians to 500 men; another made them all 11 or 12 feet high; while reports of Russian ships being seen at various points along [98] the coast were daily invented. The Government at last resolved to put down these rumours by a proclamation. This proclamation stated that a variety of rumours had become current in regard to some officials who had been sent on a visit of inspection in connexion with the arrival of some foreign ships off the coast of Yezo and Saghalien, and summarily prohibited any more talk on the subject.

The Government also urged the Northern daimios to redouble their vigilance. Matsumaye seems to have shown some remissness, for we find that about this time his territory in Yezo was taken from him, land being provided in exchange on the main island of Japan and a subsidy granted him to defray the expense of removal. The northern ports were closed to the native junk traffic, and no junk was allowed to put to sea from any ports in Ôshiu or Dewa.

The next appearance of the Russians was off the port of Hakodate. They entered the strait from the west, so they had probably come round by the north of Yezo through the Strait of La Perouse or Aniwa. They appear to have merely passed through the Hakodate Strait without making any hostile demonstration. Great preparations had been made by the Hakodate generals in the way of reviews, councils of war, watch-fires and the like, but more essential matters seem to have been neglected. Of ammunition in particular the supply was extremely scanty. Economy was the order of the day, and so rigidly were expenses cut down that there was not enough ammunition in the place to hold out for a single day's fighting. The important duty of keeping a look-out for the enemy's ships was entrusted to a merchant named Kimbei, a sort of harbour master for the port of Hakodate. He neglected to attend to it, and the consequence was that the appearance of the Russians took everbody

by surprise. Many of the towns-people and of the wives and children of the officials and soldiers took refuge in the hills. As an instance of the unprepared state of the garrison, it is stated that the gunners of a cannon in one of the batteries having applied for ammunition for their gun, were told that there was no [94] shot, and were served out twenty pounds weight of lead instead. They accordingly set to work to melt it into balls. There was only enough for two, and when they were made and carried down to the batteries, the Russian ships were already out of sight.

Soon after leaving Hakodate the Russian ships fell in with a war-junk which had left that port some days before with a reinforcement of twenty men for one of the Yezo settlements. It was commanded by Morishige Sachu, an officer who had the chief credit with the Hakodate garrison of the economical administration of affairs. Another officer was associated with him in command, but owing to a quarrel which they had about the best mode of fighting the Russians, Sachu's colleague went ashore leaving him in sole command. On board this junk was a cannon throwing a shot of about five pounds, one jingall, ten matchlocks and about 800 pounds of powder. This was considered a very respectable equipment, and Sachu was much blamed for allowing his guns to remain in the hold and not mounting them in such a way as to be able to fight his junk properly. But Sachu probably followed the wisest course open to him. As soon as the Russian opened fire, he and his men got into their boats and made for the nearest land, leaving their junk to be rifled and burnt by the enemy. The Hakodate officials were so delighted with Sachu's misadventure that it almost consoled them for the national loss which had been sustained. They were all agreed that he should have committed *harakiri*, and that if he had been a true *Samurai* he would have done so.

We next hear of the Russians at Ruitaka, a small settlement near the Kushunkotan in Saghalien. Here they burnt and pillaged as usual. There seems to have been no garrison in Saghalien at this time. The Matsumaye men had held it previously, but they had before this retired to Soya.

From Ruitaka the Russians crossed over to Riishiri, a small island near the entrance to Soya harbour. Here they found four junks mostly

laden with stores for the Soya garrison. These junks they rifled and burnt, carrying off [95] amongst other booty a 10-pounder bronze cannon captured by Taikôsama from the Koreans. The officers in charge of the junks reported to their Government that they had been wrecked in a storm. At Riishiri the Russians sent ashore the prisoners taken at Kushunkotan and Itorup. To one of them was entrusted a message to the Japanese Authorities, which was taken down in Japanese and ran as follows:—

To the Governor of Matsumaye.

The distance between Russia and Japan being but small, our Emperor sent his officers across the sea to request that trade between the two countries might be permitted. If due inquiry had been made and a treaty of commerce concluded, all would have been well, but although our officers went repeatedly to Nagasaki they were sent away without an answer. Then things took an unpleasant turn, and our Emperor commanded us to give you a specimen of his power in return for your refusing to listen to his first request. If you persist in refusing his offers we will take all your northern territory from you and if possible get an answer out of you in that way. The "Red men" can always come to Saghalien and Itorup and chase you about.

If you comply with our wishes, we shall always be good friends with you; if not, we will come again with more ships, and behave in the same way as we have done before this year.

Oroshiya.

This paper was delivered to the principal Japanese official at Soya, who composed a defiant reply, which, however, he had no opportunity of forwarding. He also concocted a scheme for inviting the Russians ashore and massacring them, but this plot was disconcerted by a storm which compelled the Russian ships to put to sea.

At this point the series of papers from which the above account is taken comes to a close. It is to be regretted that they do not contain an account of Golownin's capture, which took place a few years later.

Note.—The Russian officer commanding the two ships was Lieut. Chwostoff. He is called Koshito by the Japanese.

THE NATURE OF THE JAPANESE LANGUAGE, AND ITS POSSIBLE IMPROVEMENTS.

By the Rev. J. Edkins, of Peking.

[*Read before the Asiatic Society of Japan, on the 9th October, 1873.*]

[96] The comparison of Japanese with kindred languages may be expected to yield most interesting results. The field is a new one and its riches are therefore unknown. Why not try what it will yield?

The methods of inquiry are now better than they used to be, and in the present state of our knowledge they are not difficult to apply. Philology is now a recognized science; comparative philologists by limiting themselves almost exclusively to one family of languages have left the more to be learned by inquirers in new fields. We have grammars and dictionaries of the Chinese, Mongol and Manchu languages on the one side, and of the languages and dialects spoken on the islands of the Eastern Archipelago and of the Pacific Ocean on the other. By placing them in juxtaposition it is not difficult to assign to the Japanese language its true place in the world of speech.

The Japanese then is not in immediate sisterly relation to the Chinese, because it is polysyllabic and places the verb at the end of the sentence; nor is it Polynesian or Malay, because its adjectives do not follow their substantives, nor its genitive come after the nominative. [97] Polynesian grammar like Chinese grammar requires the verb to come before the word it governs. Not so the Japanese. The verb is rigidly attached to the end of the sentence and marks the conclusion instead of the commencement of action.

The place of the verb in Japanese is highly unnatural and seems very much opposed to simplicity and good sense. But it is far from being uncommon in language. The native of Tartary, be he Turk, Mongol or Manchu, always pays rigid obedience to the same law. He must by the necessity of his syntax say "The Lama prayers recites," "the shepherd the flock leads," "the boy a horse rides." He cannot alter the position of the nominative or objective noun or of the transitive verb. So it is also in Japanese. For the human mind to resign itself to the control of so inconvenient a law is a decisive proof of intellectual inferiority. It does not belong to the speech of nations with creative genius. There can be no just or well-founded hesitation in calling the Japanese a sister language to the Turkish, Mongol and Manchu, when it is remembered that this and similar laws reign in the domain of its syntax.

There is often visible a congruity between the history of nations and the languages they speak. Poets, historians and philosophers have all of them owed not a little to the languages they used. Greatness in literature is impossible to those who have not been born to the use of an elevated language. Hence all that the Japanese have attained, they owe to the assiduous cultivation of borrowed literature. Unfortunately when they adopted the Chinese writing and books, they made no improvement in the native syntax, and after 1600 years the laws of the collocation of words are as objectionable as they were in the infancy of the language. There has been none of that boldness in innovation which might have modified the grammar, shortened the words in the native vocabulary, struck out much of the painfully extensive honorific element, and revolutionized the syntax.

We had in the Anglo-Saxon a very good basis for our living English tongue. But before A.D. 1300 it was [98] practically impossible for great writers to achieve an immortality. The infusion of French modifying elements beginning from the Norman conquest, and of Hebrew originated by the intense study of our Sacred Records modified and moulded our language to a form which might suit the genius of Shakspeare.

The Japanese pedagogue does not permit similar modifying influences to come into the sphere of his thought and produce improve-

ment in his language. He admits new words to any extent, but the grammatical framework of the language remains. In translating Chinese he alters the order of words to suit his own syntax, instead of allowing the Chinese syntax to improve his own.

But what will these islanders now do with English? It will be well for the intellectual progress of Japan if under this new impulse, which forces the native mind onward in the path of educational improvement, it should become conscious of a power to renovate the native language. This would be worth more to the people than hundreds of steamers and thousands of miles of railways. The English language is much more fitted than the Chinese, to improve the Japanese language. There is more freedom in its syntax, and by its polysyllabic structure it is more akin to the Japanese, and perhaps better able to lend to it elements of lasting utility.

The question mooted by Mori, the Minister to Washington, is of high importance in a way perhaps which did not strike his own mind. The substitution of English for the native language appears to many persons an impossibility, and therefore the proposition is regarded as absurd. But if the question is modified so as to refer particularly to the renovation of the native language by contact with European speech, it becomes highly practical and interesting.

The position of Japanese in language as a cousin of the Tartar modes of speech and with them of the Tamul and other languages of South India, may be decided by the place assigned to the verb as already remarked. This may be regarded as characteristic unique, uniform and conclusive. But it carried with it other laws, such as the [09] following; case-marks must be suffixes. And why? These case suffixes are themselves chiefly verbs. It is the law of the position of the verb which originates and necessitates the law of the position of case marks. The one law embraces the other. Treat the case-mark as a verb and its proper place is after its noun. *Kara* "from" *made* "to" must then be looked for among verbs meaning, for example, to begin and terminate action. Among Chinese roots we have *kai* to open, *k'i* begin, *pit* and *mat* to end. To some such roots I should look for the origin of these Japanese case-marks.

Another group of case-marks, those which indicate the nominative,

genitive and accusative, are more correctly regarded as demonstrative pronouns. The Japanese and Mongol usage in regard to these are the same, as may be seen by comparing them. In accounting for their origin there need be no great difficulty felt. Take the old English, John Smith his book. *His* has in modern English become abbreviated into an *s*. The principle would be the same if *he* were used instead of *his*. Probably no genitive particle in any language has any other origin than this. Bopp explains genitives in this way, and his system in this respect serves as well for the Eastern Asiatic languages as for those which he examined.

We may go farther than this. The growth of the European verb tree may be illustrated for Japanese and kindred languages. The European languages are the most perfect and finished in the world. Rudimentary forms are therefore more lost to view in Latin and Greek Grammar than in the more primitive speech of Eastern Asia, where the verb is in a sort of chrysalis condition. As the caterpillar changes into the chrysalis and then into the butterfly, and the leaf into the bud and then into the flower, so the bare and unornamental forms of Chinese grammar are seen passing into the crude transitional state assumed by the verb in Japanese and Mongol, previous to their European development, where we find them embracing those varieties of voice, mood, tense and person which strike us by their precision, richness and beauty. By dissecting [100] the verb in its intermediate condition as in Japanese, Tartar or Tamul, we can trace much of the process by which the European verb was formed.

In the European or Sanscrit verb there is no more interesting point than the formation of the past tense indicative from the principle. One of the ways in which this is done is easily seen in colloquial Japanese. In Mr. Aston's "Colloquial Grammar" he says "the *ta* of the past tense is a shortened form of *taru*, which is itself contracted from *te aru*, *te* being the termination of the particle and *aru* the verb to be." The crucial point here to be noticed is that the past tense indicative is formed from the participle. So in English the past indicative "loved" is formed from the participle "loved," by the instinctive effort of language, which is always striving after the attainment of greater precision and variety of idea.

But the question is asked, how does the participle receive an indicative sense? It may be by dropping the last word. Thus in Mongol "yaboju boi," *he is having gone*, becomes in colloquial use "yabaji," *he is gone*, and sometimes, *he went*. In this easy way a participle or gerund becomes indicative. Sometimes we cannot trace such a loss of a last word. Thus in Greek ἐλέγον *I said* from λέγων λέγον *saying*. We may then invite attention to a law described in Mr. Aston's Grammar of written Japanese, by which verbs assume two forms, according as they are complete in action or not. The form of completed action occurs in the last place and has a peculiar suffix. The form of incomplete action wants this suffix, and its place is earlier than the last. The law appears in Mongol with greater distinctness. A special suffix, *ksan*, belongs to the category and expresses completed action.

In the Mongol expression "bi martaju boi" *I have forgotten*, we have a pronoun "bi," *I*, and two verbs, one meaning *to forget* and the other *to be*. The verb, to be, is in its primitive radical shape and corresponds in sense and use nearly to the Japanese *aru* and *masu*. Etymologically it is more closely connected with *masu*, than with "aru," *b* [101] and *m* being interchangeable letters.[1] The suffix *ju* in *martaju* was probably, at an earlier stage, a sort of case suffix used like the Japanese *ni* in a like position, that is when attached to verbs. It gradually assumed the character of a participial or gerund suffix. In the modern colloquial Mongol the final verb, *boi*, is omitted and "martaji" (which is the same as "martaju,") is a past indicative, *I have forgotten*. So the participle or gerund grows out of the law of position by which, when verbs are used together, completed action claims the last place and incomplete action earlier place. Let us call this the first stage of metamorphosis. The participle or gerund takes in the next place as a suffix an old verb (for example *ju* that is *de*) which has become transformed into a case mark. So far there are two

[1] B in Mongol frequently corresponds to *m* in Japanese, as in the following examples:—biye or beye, *body* Jap. mi.

Bedere hu, to seek, Jap. motome.

Basa, and, also, Jap. mo.

Buri, all, altogether, Jap. mattai or mattaku.

stages of formation. Then the participle becomes transformed into a past indicative. This is a third stage.

Grammar is the work of the human mind, operating systematically on linguistic elements within its reach in an instinctive and unconscious manner. One language shews some special process better than others. Take the expression in Hepburn's Dictionary "hanashi wo kiki ni itta," *he has gone to hear what is said*, "kiki," *hear*, with the suffix "ni," *to*, is a verb in the supine in a crude state, where the suffix is still disconnected from the verb to which in favourable circumstances it may subsequently become indissolubly allied. The book Mongol has a true supine ending in "*re*." It is an instance of a noteworthy fact, viz., that the grammar of the Tartar languages is more advanced than that of Japan, and possesses a verb tree more like that of European grammar. All languages are, in a state of transition from one state to another, guided by the principles which are peculiar to them. It is possible for them to be improved by the adoption of new principles. Those who have the control of education and literature wield a power which should always be used for [102] the progressive improvement of languages. Without this all languages deteriorate and pass into decay.

If we understand the place held by the Japanese language, and estimate rightly the value of its special principles of development, it undoubtedly appears possible to improve it by the adoption of suitable educational methods with the aid of English-speaking teachers and of the Government department of public instruction,—the Mombushô.

When fifteen hundred years ago the Chinese language was brought over to Japan and taught in schools, no effort was made to introduce changes into the native grammar. The Chinese and Japanese Buddhists taught Buddhism. The object of attention and admiration to the Japanese youths of the time was the literature of China; no attempt was made to translate the Buddhist books or those of Confucius into the Japanese tongue. It was the task of the educators to teach both in the Chinese language. The consequence was that Chinese words and phrases were imported into the Japanese language wholesale. The Japanese medium of thought remained in all its grammatical categories unchanged. Nothing but the use of numeratives between numbers and nouns, such as the word "ban" in "ichi ban ni," *the first article*, and perhaps some few other un-

important additions, was gained to the grammar. The old stiffness of the laws of position was still retained. This is much to be regretted; a fine opportunity was lost of altering the grammar for the better.

Now that the Mombushô has undertaken to establish instruction in English throughout Japan, another such opportunity for modifying the inconvenient principles of the native grammar is afforded: a vigorous effort now made to correct vicious principles of grammar, and introduce the germs of solid improvement on a sound philological basis would open a new path of progress to the language.

There is no good reason for the verb always coming last, or for the case-marks being always suffixes. Why not attempt to restrain and modify these capricious limitations? I would propose the introduction of the English prepositions, *from*, *to*, *by*, *with*, and would recommend [108] that teachers should not allow them to be placed after their nouns. It should be the duty of the teacher in schools to enforce English syntax, so as to accustom the youth of the country to think in the European manner, and to the adoption of our order for the words.

The method I have recommended for use is the reverse of "pidgin English." The characteristic of that jargon is that it uses English words in a Chinese order. The Japanese in learning Chinese were guilty of the same mistake: they read Chinese in a Japanese order. They would have done better if they had adopted the Chinese grammar with the Chinese words. Had they early insisted in native schools on reading Chinese in its order instead of altering it as they now do into a Japanese order, they would long since have introduced into their native tongue principles from which their language would have derived the greatest benefit. By this time the whole nation would have been accustomed to freedom in the place of the verb and of the case-marks. There would then be a better prospect of progress in the formation of a good native literature.

The introduction of English words into the Japanese language should also by all means be encouraged. It is not an opprobrium to a vocabulary to be rich in words, derived from various sources. Poverty in a vocabulary indicates poverty in ideas. Our English words are instinct with the life of modern science, art, and learning. The appetite of the Japanese youth for foreign words and knowledge is a happy

circumstance and should be gratified. Thus their language will be enriched and may achieve something more in the world than it has yet been able to do under the painful restrictions to which it has been subjected. Let it not be said that the vocabulary will become heterogeneous in character. Is not our own English eminently so? All languages are liable to this charge if carefully examined. If we take the Japanese vocabulary as it is and compare it with the Chinese and Mongol, it is seen to be of the most composite character. I do not here refer to Chinese words introduced [104] such as "konuichi" *to-day*, "sakuban" *last evening:* I speak of the native part of the vocabulary.

Thus "uma", horse, is the Chinese ma, and Mongol "mori", with *u* prefixed; "sakana", fish, is the Mongol "dagas" with the *d* changed to *s*. This tendency to sibilate appears in the Japanese syllabary very distinctly. What but this has introduced irregularity into the *t* series, and changed "ta," "ti," "tu," "te," "to," into "ta," "chi," "tsu," "te," 'to?" The same principle of sibilation which, since the invention of the Japanese syllabic *kana* ten centuries ago, has expelled *ti*, *tu*, *di*, and *du*, from the list of sounds and introduced *chi*, *tsu*, *ji* and *dzu* in their place, operated at an earlier period to change the (Hebrew "dag" and) Mongol "dagas" into "sakana". So also "shita" *below*, is in Mongol "dôtai"; "soroi" *to agree, correspond, be a match for*, is in Mongol "taraho."

I give some examples from Japanese words begining with *k*. The Mongol equivalent is *k* or *g*. "Kutsu," shoes *gotal;* "kitsui", fierce, strong, *kuchu;* "kayeru", return home, *hairehu;* "oki", great, *ihe;* *huldehu*, freeze, "kôri"; "koto", thing, *hereg;* "kotoba", speech, language, *hele;* "kotaye", return answer, *hairehu;* "kuro," black, *hara;* "kawa", river, *gol;* "katai", hard, *hatago;* "katana", knife, sword, "hadogor", sickle; okure, behind, *hotai.*

In identifying these words let it be assumed that the letters l and r both come out of t or d. This is in language so common a phenomenon that it is needless to prove it here.

In making a comparison of words throughout the vocabulary, the following changes of letters come to view.

The Japanese k corresponds to h, k and g of other languages. The Japanese h, f and b correspond to the b, p and f of other languages.

The Japanese ts, ch, sh, z, s, j, and r belong to the t and d of other languages, together with the s, l, and r of those languages. The Japanese w and y may usually be referred to g and d respectively.

The Japanese *m* at the end of the root very often corresponds to the final *ng* of Chinese roots.

[105] The Japanese initial *m* corresponds often to the *b* of other languages. In modern Japanese m becomes *n* when final.

The Japanese vocabulary if compared with constant reference to these correspondences of letters will be found to have little of purely native growth.

Thus hosoi is *petit*.

hitotsu is Turkish bir *one* and the Engl. *first*.

hineri is the Chinese *pien* to plait, twist.

futatsu is the English *both*.

samui, cold, is the Chinese *shwang*.

same, to awake, is the Chinese *sing*.

sama, shape, form, is the Chinese *chwang*.

sumeru, clear, is the Chinese *ts'ing*.

sumi, to end, is the Chinese *chung*.

Enough has been said to shew that if any one undertook to prove that generally the native Japanese words are of home growth he would have a hopeless task. The examples adduced are most of them beyond cavil.

Such being the state of the Japanese language, there is no reason why the process of enriching the vocabulary should not be allowed to continue. This is only to do what has been done before, whether before or after the beginning of Japanese history. They were once a Tartar people who came by way of Corea into the beautiful islands they now inhabit. They drove the Ainos, a people originally, as shewn by their hair, of a much more northerly home, into north Nippon and afterwards into Yesso, and proceeded to develop their legends and their grammar till they reached their present form. When the unassisted progress made by the native mind in the formation of religious myth and of the formulæ of Japanese speech had proceeded to the extent which they were capable of reaching, the Chinese language and system of thought appeared on the scene. The effect was most remarkable. A system of

instruction was established which resulted in the introduction into the language of many thousands of foreign words and expressions. This was the work of school training in the hands of Japanese masters and assisted by the government. At the present day we find in the common [106] talk of the people, including the uneducated men and the women of all classes, Chinese expressions which may be counted by thousands. This striking fact clearly shows the effect of schools in modifying popular speech.

In accounting for this remarkable adoption of Chinese words and phrases the aid of Buddhism must not be overlooked. Religion is always a powerful factor in modifying language. For three centuries the *Go on*, the pronunciation of Chinese words common among the Buddhist monks, prevailed exclusively in Japan. Early in the seventh century Japanese students were sent to the Chinese capital, in the province of Shensi, to study the Chinese language more thoroughly and to bring back books and information bearing on the Confucian religion. The Japanese at that time were so enamoured of everything Chinese that they adopted it in the most wholesale manner, and never thought of an alphabet for themselves till late in the eighth century. There was no one to undertake to alter the Japanese language and the attempt was never made. When at last the alphabet was invented, its chief use was to aid pupils in learning the sense of the Chinese books, and the sounds of the characters. As, however, most pupils never learned Chinese thoroughly, a mixed written language grew up, resulting in the native literature which has since come into existence.

To foresee what, if left to themselves, would be done by the Japanese in regard to English is not difficult. They would treat English books as they have been accustomed to treat Chinese books. They would introduce the *kana* into English works to assist students. The native order of words would still be retained and an immense number of new words would be added to the vocabulary.

This course, so highly to be deprecated, they may be induced to avoid. The advice, example and reasoning of foreign teachers may persuade them to learn English in a more enlightened way, and more thoroughly than they have learned Chinese. In schools where English is taught, a mastery of the grammar and the pronunciation should be

made a *sine quâ non*. No vicious pronunciation or [107] erroneous syntax should by any means be allowed. When the Mombushô according to its present programme proceeds to appoint native schools for an English education throughout the country, particulars pains should be taken that the teachers appointed are qualified to give instruction and enforce correctness in these two particulars.

The consequence of this will be that the principles of European grammar will become familiarized to the juvenile mind of the country. The syllabary will also be greatly enlarged. There is in the English language a very great variety of syllables. By their adoption the Japanese syllabary would be more than doubled in capacity. Their acquisition of the letter, l, of th, of f, would be a great gain. They would have a vast number of compound initials such as str, pl, kl, tl, pr, kr, tr. The lost syllable ti, di, tu, du, and others would be restored. Finals such as m, rm, rd, lk, lt, ks, ps, nd and many others would be added. By such means a very poor syllabary would become rich. The enunciation of the native of Japan would become as full of energy, variety and expressiveness as our own. He would become master of two languages—the one spoken by him from a child, marked by perverse laws for which no good reason can be given, and a syllabary soft and melodious, indeed, but wanting in force, range, and adaptability; the other cultivated, scientific and unrivalled for compass, flexibility and variety.

Let us suppose that in all the 40,000 or 50,000 schools intended to be established by the Mombushô really good English were learned by the boys, could not something decidedly valuable be then done for improving the native language? An immense number of words will soon be added to the vocabulary. The most assiduous care should be taken that they be correctly pronounced. In the departments of religion, science, navigation, politics, and all the arts of the west the importation of new words should be encouraged. For example the word God is so far superior to the Japanese term *kami*[3] that it would be well [108] to

[3] The word *kami* at first meant the souls of ancestors, and afterwards the gods of the Shintô religion, which are in fact the souls of ancestors deified. The Buddhists and Romanists have both avoided the term kami. The Protestant Missionaries would do well to imitate their caution. Christian theology seems to require a better word for the Divine Being.

adopt it at once by the unanimous determination of all who are interested in the spread of Christianity among the vivacious people of these lovely islands.

The importation of new words, however, will not be enough. The native grammar requires to be expanded and the syntax remodelled. This can only be accomplished by the resolute and enlightened handling of those who, whether natives or foreigners, have charge of the new system of education. I mention here several particulars which appear to be important.

1.—The introduction of English prepositions to be used interchangeably with the Japanese post positions; such are, in, up, from, to, by, with, above, below, etc. Such words should keep their own position before the noun, while corresponding Japanese words retain their place after the noun.

2.—The directive adverbs up, down, in, out, above, below, should be introduced as appendages to verbs. It is found very convenient by Chinese, Polynesians and Englishmen to be able to indicate the direction of a verb's action by these and similar words, *e. g.*, press up, press down, press through.

3.—The article should be introduced. It has been found of great use in English, French, Greek and other of the most perfect languages spoken by man.

4.—The relative pronoun should be introduced. The Japanese interrogative *dare* would form a good base for it, but perhaps the English *who*, *which*, *that*, would in the circumstances of the country be better.

5.—The English syntax in regard to verbs should be carefully followed. There could be no better guide than the Bible, because of its Hebraistic cast of expression. For example: "In those days came John the Baptist preaching in the wilderness of Judea." To accustom the Japanese youth to place the verb "came" before "John" and "preaching" before the words "in the wilderness," [109] would be of the greatest benefit to them, because, though contrary to native rules of grammar, it is according to the law of nature and is authorized by the usage of languages of the best type.

6.—The introduction of the genitive with "of" would also be a

benefit adding greatly to flexibility and agreeably varying the expression of native thought. They might learn to say "The Ko of the Mikado" as a variation of *Mikado no ko*. As these changes found place in the language the present imperfect literature of the country might be ameliorated and elevated. Poetry with sweet, rhyming measure would become possible. The orator's eloquence might be exhibited in assemblies of the people. Government despatches and epistolary correspondence would undergo a beneficial renovation.

Perhaps, however, English teachers will consider that their task is done if they teach good English to pupils. They will not readily be persuaded that it is part of their work to improve the native language. It is the only aim of this paper to point out the importance of the object in view, and to offer some suggestions as to how in should be done, in the hope that educators will take it into consideration.

The government has great power on account of the submissiveness of the people. In China the improvement of the native language by foreign educators is utterly impracticable. It is not so in Japan. The institutions of the country are in the hands of the Government. The gradual abandonment of a Chinese education by the Japanese would open their minds to a true philosophy, and allow of a much more useful education being imparted to the youth of both sexes than that which they now receive. But this object might be gained without the sacrifice suggested by Mori, Ambassador at Washington, of the native language.

Instead of abandoning the native language in favour of English, it [110] should be enriched by large additions and the extension of its idioms after the European type of language. The more able pupils in schools will learn to speak English thoroughly. For an inferior class, books should be provided by a commission under the superintendence of foreign educators and of the Mombushô. For them a new idiom should be furnished on some such system as that recommended in this paper for a judicious amalgamation of the English and Japanese idioms. The rules of this amalgamation should not be left to chance and caprice. They should be adopted with forethought and with due attention to the principles of philology.

There is no more ill-founded prejudice than that which takes for granted the equality of languages in excellence and in suitability for literary

development. A good literature never can grow out of a poor language, and consequently all languages are found to be poor which have not a good literature. The best languages in modern Europe are the English, the French, and the German, just as the literatures of England, France, and Germany are also the best in Europe. So the Japanese language and literature are both poor, the literature being the reflection of the language.

Of course it would be better for the Japanese to improve their own language than for the foreign educators to undertake the task. But they will probably not do it without foreign help. It is also a problem beyond their competence in the present state of things. It would be an achievement worthy of the foreign educator, in the most practical and scientific age the world has ever known, to take in hand the Japanese language and mould it into a shape which should adapt it for the production of a fine literature, and for all the noble uses to which a well-constructed language can be devoted.

There never was a nation more willing than the Japanese to make changes if they only knew how, and except in regard to our religion they have shewn a truly liberal desire for knowledge of all kinds. Through a false impression they are for the time opposed, very unwisely, to the teaching of our religion. This limitation to their liberality they will probably soon abandon. When they have done so they will prove themselves to be deserving of our fullest sympathy and aid.